Progressive Resistance Training in Patients with Hip Dysplasia scheduled for Periacetabular Osteotomy

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Disclosures

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  – No travel support

• Outside present study:
  – No conflicts of interest
Background

- Progressive resistance training (PRT) may be effective in:
  - Improving hip strength
  - Improving physical function
  - Reducing hip pain

  - Shown in patients with groin and hip OA-related pain

- No studies on patients with hip dysplasia

Purpose

• To examine if PRT is feasible in patients with hip dysplasia in terms of compliance, drop-outs, adverse events and pain responses to the training program

• A secondary purpose was to report data on changes in patient reported outcomes, functional tests and hip muscle strength
Design

- **Feasibility study**

- **Inclusion criteria**
  - Diagnosed hip dysplasia and scheduled for periacetabular osteotomy
  - Age ≥ 18 years
  - Lived within 50 km of Aarhus
  - Able to transport herself to the training location

- **Exclusion criteria**
  - Co-morbidities and history of previous surgical interventions affecting the function of their hip
Intervention

- 8-weeks of PRT with at total of 20 training sessions (5 sessions per 2 weeks)

- 5-10 min warm-up on a stationary bicycle

- 5 exercises: leg press, hamstring curl, walking lunges, knee extension, hip flexion

<table>
<thead>
<tr>
<th>Week</th>
<th>1-2</th>
<th>3-4</th>
<th>5-6</th>
<th>7-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Repetitions</td>
<td>12</td>
<td>12</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Intensity RM</td>
<td>15</td>
<td>12</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Rest (in sec)</td>
<td>80</td>
<td>80</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
Exercises

1. 

2. 

3. 

4. 

5.
Feasibility was assessed based on:

- VAS scores ≥50 (high-risk category)
- Drop-outs
- Adverse events
- Compliance to training (≥80%)

Test procedures

Pre- and post intervention:

- Copenhagen Hip and Groin Outcome Score (HAGOS)

- Functional tests:
  - Standing distance jump
  - Countermovement jump

- Muscle strength
  - Isometric
  - Isokineti
Feasibility outcomes

- 85 eligible patients, 17 included
- 1 dropped out
- Median age 28 years (22-40)
- 12/16 were women
- 12/16 had bilateral hip dysplasia
- 2/16 had previously PAO
- Average compliance 90.3%
Feasibility outcomes - pain

Pain responses to intervention

A) Pain immediately after training

B) Pain 1 day after training
Feasibility outcomes - adverse events

<table>
<thead>
<tr>
<th>Adverse Events</th>
<th>Patients (n=16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients cancelled sessions due to pain</td>
<td>No. of patients</td>
</tr>
<tr>
<td>(no. of sessions cancelled per person)</td>
<td>Patient fraction (%)</td>
</tr>
<tr>
<td>Self-reported knee joint symptoms</td>
<td>4 (5, 2, 3, 1)</td>
</tr>
<tr>
<td>Injured index finger</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
Secondary outcomes - HAGOS

- HAGOS scores for different outcomes:
  - Symptoms
  - Pain
  - ADL
  - Sport/rec
  - PA
  - QOL

Comparison between pre-test and post-test:
- Pre-test
- Post-test

Significance levels:
- * p < 0.05
- ** p < 0.01
## Secondary outcomes - functional tests

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>Change</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SDJ (cm)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affected side</td>
<td>93.7 [77.7, 109.8]</td>
<td>102 [88.3, 115.7]</td>
<td>8.3 [1.2, 15.3]</td>
<td>0.025</td>
</tr>
<tr>
<td>Non-affected side</td>
<td>91.4 [73.6, 109.1]</td>
<td>100.7 [84.1, 117.3]</td>
<td>9.3 [4.0, 14.6]</td>
<td>0.002</td>
</tr>
<tr>
<td><strong>CMJ (cm)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affected side</td>
<td>10.2 [7.7, 12.8]</td>
<td>12.0 [9.8, 14.2]</td>
<td>1.8 [0.7, 2.9]</td>
<td>0.005</td>
</tr>
<tr>
<td>Non-affected</td>
<td>11.3 [9.0, 13.6]</td>
<td>12.2 [10.2, 14.3]</td>
<td>0.9 [-0.2, 2.0]</td>
<td>0.092</td>
</tr>
</tbody>
</table>
### Secondary outcomes - muscle strength

<table>
<thead>
<tr>
<th>MVC (Nm)</th>
<th>pre-test</th>
<th>Post-test</th>
<th>Change</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Isometric hip flexion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affected side</td>
<td>121.4 [95.4, 147.4]</td>
<td>125.8 [104.9, 146.7]</td>
<td>4.4 [-9.6, 18.4]</td>
<td>0.516</td>
</tr>
<tr>
<td>Non-affected side</td>
<td>124.7 [102.0, 147.4]</td>
<td>135.7 [110.9, 160.5]</td>
<td>11.0 [1.1, 21.0]</td>
<td>0.032</td>
</tr>
<tr>
<td><strong>Isokinetic hip flexion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Concentric</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Affected side†</td>
<td>115.7 [95.1, 136.2]</td>
<td>131.5 [109.1, 153.9]</td>
<td>15.8 [5.9, 25.8]</td>
<td>0.004</td>
</tr>
<tr>
<td>Non-affected side</td>
<td>121.5 [97.2, 145.7]</td>
<td>129.3 [108.9, 149.8]</td>
<td>7.9 [-6.0, 21.7]</td>
<td>0.245</td>
</tr>
<tr>
<td><strong>VAS (mm) pain during MVC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affected side</td>
<td>25.2 [9.7, 40.5]</td>
<td>9.0 [0.9, 17.0]</td>
<td>-16.1 [-31.8, -0.4]</td>
<td>0.045</td>
</tr>
<tr>
<td>Non-affected side</td>
<td>8.7 [0.0, 18.6]</td>
<td>7.6 [0.0, 15.7]</td>
<td>-1.1 [-12.5, 10.4]</td>
<td>0.842</td>
</tr>
</tbody>
</table>
Conclusion

• Progressive resistance training in patients with hip dysplasia scheduled for PAO is feasible

• PRT may improve pain, patient reported outcomes, function and flexion muscle strength

• In future RCT, we plan to add hip abduction and extension exercises to increase hip muscle strength
Thank you
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