Supplementary File 3 – Proximal rehabilitation compared to quadriceps rehabilitation group study characteristics

<table>
<thead>
<tr>
<th>Author</th>
<th>Intervention</th>
<th>Control</th>
<th>Variables measured</th>
<th>Follow up</th>
</tr>
</thead>
</table>
| Proximal rehabilitation v Quadriceps rehabilitation | Ferber et al. [44] Proximal and core focused exercises (n= 111)  
- Performed 6x per week (3x per with trainer)  
- 6 week intervention period  
Week 1  
- Proximal abduction – standing;  
Proximal external rotator – standing;  
Proximal external rotator – sitting;  
All 3x10repetitionss (resistance band)  
Week 2  
- Proximal abduction – standing;  
Proximal external rotator – standing;  
Proximal internal rotator – standing;  
All 3x10reps (resistance band)  
Week 3  
- Proximal abduction – standing;  
Proximal external rotator – standing;  
Proximal external rotator – sitting;  
All 3x10reps (stronger resistance band)  
- Balancing 2 feet on Airex® pad  
3x30-45seconds | Quadriceps exercise (n= 88)  
- Performed 6x per week (3x per with trainer)  
- 6 week intervention period  
Week 1  
- Isometric quadriceps setting Knee extensions—standing  
Double-legged, one-quarter squats; 3x10 repetitions  
Week 2  
- Isometric quadriceps setting;  
Double-legged, one-half squats;  
Terminal knee extension w/ resistance band; 3x15 repetitions;  
Double-legged, one-quarter squats; 3x30seconds  
Week 3  
- Double-legged, one-half squats;  
Single-legged, one-quarter squat;  
Double-legged, one-quarter wall squats; 3x10 repetitions;  
Terminal-knee extension w/ resistance band  
3x10 repetitions with stronger band  
Week 4  
- Single-legged, one-half squats;  
Forward, one-quarter lunge;  
Lateral step-down (4-inch [3.6 cm] step), No.;  
Forward step-down (4-inch [3.6 cm] step), No.;  
3x10 repetitions;  
Double-legged, one-half wall squats; |  
- Pain  
- VAS  
- Function  
- Anterior knee pain score  
- Strength  
- Proximal abduction  
- Proximal extension  
- Proximal internal rotation  
- Proximal external rotation  
- Knee extension | 6 weeks |
<table>
<thead>
<tr>
<th>Week 4-6</th>
<th>3x30seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Proximal extension 45˚ – standing; Proximal external rotator – standing; Proximal external rotator – sitting; All 3x10-15reps (resistance band)</td>
<td>Week 5-6</td>
</tr>
<tr>
<td>• Balancing 1 foot on Airex® pad 3x45-60seconds</td>
<td>• Double-legged wall squat (to max 90˚ of knee flexion); 3x45-60seconds;</td>
</tr>
<tr>
<td>Dolak et al.</td>
<td>• Lateral step-down (6–10 in [5.6–9.6 cm] step); Forward step-down (6–10 in [5.6–9.6 cm] step); Forward one-half full lunge (to maximum 90˚ of knee flexion); Single-legged one-half full squat (to maximum 90˚ of knee flexion); 3x15 repetitions</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>4 weeks initial proximal abduction and external rotation rehabilitation followed by 4 weeks weight bearing exercises (n=17)</th>
<th>4 weeks initial quadriceps rehabilitation followed by 4 weeks weight bearing exercises (n=16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Exercise completed 3xper week (1 supervised, 2 at home)</td>
<td>• Exercise completed 3xper week (1 supervised, 2 at home)</td>
</tr>
<tr>
<td>• Seated hamstring stretch, standing quadriceps stretch and standing wall stretch for triceps surae for 3x30sec prior to rehabilitation</td>
<td>• Seated hamstring stretch, standing quadriceps stretch and standing wall stretch for triceps surae for 3x30sec prior to rehabilitation</td>
</tr>
<tr>
<td>• Progression made on an individual basis by the treating clinician within protocol limits</td>
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</tr>
<tr>
<td>• Side-lying proximal abduction/external rotation +/- 3-7% of body weight 3x10repetitions</td>
<td>• Quad sets</td>
</tr>
<tr>
<td>• Standing proximal abduction +/- 3-7% body weight 3x10repetitions</td>
<td>• Short arc quads +/- 3-7% body weight</td>
</tr>
<tr>
<td>• Seated proximal external</td>
<td>• Straight leg raises +/- 3-7% body weight</td>
</tr>
<tr>
<td></td>
<td>• Terminal knee extension with 3-7% body weight</td>
</tr>
</tbody>
</table>

| • Pain | • VAS |
| • Function | • LEFS |
| • Strength | • Isometric proximal abduction strength |
| • Isometric proximal external rotation strength | • Isometric knee extension strength |

4 Weeks
| **Khayambashi et al.**<sup>43</sup> | 8 weeks posterolateral proximal rehabilitation exercises  
- Exercise completed 3 times per week, supervised by a therapist  
- 5 min walking warm up  
- 20 mins resistance banding exercises for proximal abduction and external rotation – 3 sets of 20-25 reps using progressively increasing resistance banding  
- 5 min walking cool down | 8 weeks quadriceps rehabilitation exercises  
- Exercise completed 3 times per week, supervised by a therapist  
- 5 min walking warm up  
- 20 mins resistance banding exercises – seated knee extension against resistance banding, and squatting - 3 sets of 20-25 reps using progressively increasing resistance banding  
- 5 min walking cool down |  
- Pain  
- VAS  
- Function  
- WOMAC | 8 weeks and 6 months |
| **Baldon et al.**<sup>44</sup> | 8 weeks functional stabilisation exercises directed at the proximal and trunk  
- Exercises performed 3 times per week supervised  
- First 2 weeks – exercises focused at enhancing motor control at trunk and proximal – 20% of 1 repetition maximum – 2x20 repetitions  
- Next 3 weeks – exercises to increase proximal strength and maintain motor control – 75% of 1 repetition maximum – 3x12 repetitions  
- Final 3 weeks – intensity increased whilst maintaining | 8 week standard training programme focused on quadriceps rehabilitation  
- Exercises performed 3 times per week supervised  
- Comprised of combination of stretches, open and closed kinetic chain exercises  
- Included straight leg raise, knee extension, leg press, wall squats, step ups, single leg standing on unstable platform  
- First 2 weeks – exercises focused at enhancing motor – 20% of 1 repetition maximum – 2x20 repetitions  
- Next 3 weeks – exercises to increase quadriceps strength and maintain motor control – 75% of 1 repetition maximum – 3x12 repetitions  
- Final 3 weeks – intensity increased whilst maintaining |  
- Pain  
- VAS  
- Function  
- LEFS  
- Single leg squat kinematics  
- Trunk, pelvis, proximal and knee  
- Trunk endurance and eccentric torque | 8 weeks and 3 months |
<table>
<thead>
<tr>
<th>good lower limb alignment - 75% of 1 repetition maximum</th>
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<tbody>
<tr>
<td>• 1 repetition maximum assessed at 3 and 6 weeks</td>
</tr>
<tr>
<td>• All exercises performed within 3/10 pain limits</td>
</tr>
<tr>
<td>maintaining good lower limb alignment - 75% of 1 repetition maximum</td>
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<tr>
<td>• 1 repetition maximum assessed at 3 and 6 weeks</td>
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<td>• All exercises performed within 3/10 pain limits</td>
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WOMAC = Western Ontario and McMaster osteoarthritis index