Changes in performance over time while learning to use a myoelectric prosthesis


Products

Myoelectric simulator - MyoHand VariPlus Speed

Major Findings

For different types of practice:

→ A training program should spend more time on learning fine control aspects such as grip force control
→ Training should start with the indirect grasping tasks (handing over an object from the unaffected hand to the prosthetic hand)
→ Patients should train in a blocked repeated fashion

Time needed to grasp a low resistance objects

<table>
<thead>
<tr>
<th></th>
<th>direct grasping</th>
<th>indirect grasping</th>
<th>fixating</th>
</tr>
</thead>
<tbody>
<tr>
<td>(s)</td>
<td>0.5</td>
<td>1.5</td>
<td>2.5</td>
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</table>

Participant needed the shortest amount of time to hand over an object from the unaffected hand to the prosthetic hand (indirect grasping) than to directly grasp an object or to fix it (e.g. unbutton and buttoning).

Population

Subjects: 62 healthy, able-bodied participants
Previous: none
Amputation causes: none
Mean age: 21 ± 2 years
Mean time since amputation: none
Participants in the experimental condition, randomly assigned to one of four groups, practiced with a myoelectric simulator for five sessions in a two-week period. Group 1 practiced direct grasping, Group 2 practiced indirect grasping, Group 3 practiced fixating, and Group 4 practiced a combination of all three tasks. The Southampton Hand Assessment Procedure (SHAP) was assessed in a pretest, posttest, and two retention tests. Participants in the control condition performed SHAP two times, two weeks apart with no practice in between.

<table>
<thead>
<tr>
<th>Category</th>
<th>Outcomes</th>
<th>Results for different types of practice</th>
<th>Sig.*</th>
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<tbody>
<tr>
<td></td>
<td>Southampton Hand Assessment Procedure (SHAP)</td>
<td>The experimental groups improved more on SHAP than the control group.</td>
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<td></td>
<td>Compression during grasping</td>
<td>The indirect grasping group had the smallest object compression.</td>
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<tr>
<td></td>
<td>Grasping time</td>
<td>The indirect grasping group had the smallest grasping time.</td>
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</table>

* no difference (0), positive trend (+), negative trend (−), significant (++/−−), not applicable (n.a.)

**Author's Conclusion**

“Learning processes were examined in participants that learned to use a prosthetic simulator in different goal directed tasks. Results showed that grasping force control took longer to learn than positioning of the hand and that indirect grasping was beneficial for controlling the grip force. Groups of tasks improved grasping control to the same level than training each type of task. The number of grasping trials in practice were similar and even after a period of non-use. Suggestions for clinical practice are to focus specifically on grip force control of the hand, to start to train with an indirect grasping task, and to train in a blocked-repeated fashion.” (Bouwsema et al. 2014)