SEMG investigation of lower limb and abdominal muscles during progressions of a core stability exercise

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What is core stability?


Minimal compensation
Background

- Clinical presentations
- Low level exercises
  - Posterior pelvic tilt exercise
Evidence

- SEMG of Abdominals
  - Vezina and Hubley-Kozey (2000) – healthy
Gaps in evidence base

- PPTE investigating IO and EO activity
- Progression of PPTE exercises
- Consideration of compensatory activity
Aim

- Investigate bilateral IO and EO during a low level core stability exercise (PPTE), with two progressions (right leg drop out and a bilateral arm raise) and to monitor LL (bilateral hamstrings and Quadriceps) activity.
Design and method

- Same subject experimental design
- Convenience Sample – healthy (n=22, females= 19 (mean 21.9 yrs)
- Measure – SEMG bipolar, Bilaterally, Skin prep (Turker, 1993)
- Same day standard protocol - Intra tester reliability for abdominals - (Ng et al, 2003 - ICC = 0.75-0.89)
- MVC (Dankaerts et al, 2003 – ICC 0.91)
- Ethical approval / Data protection Act (1998)
Clinical Governance

Department of health definition of clinical governance:

'Clinical Governance is a framework by which NHS organisations are accountable for continuously improving the quality of their services and safeguarding high standards of care by creating an environment in which excellence in clinical care will flourish'.

What is Clinical Governance?

It is about making sure that the NHS can provide high quality patient care. All quality improvement activities now fall within a framework that NHS organisations are applying to ensure that health care delivery is safe, of a consistently high quality, puts the patient first and is constantly improving. This is done by setting, implementing and monitoring targets for standards of quality and by making sure that the most appropriate working systems are used with the right structures and culture in place.

(Freriks et al, 1999)
BASELINE PPTE

RIGHT LEG DROP OUT

BILATERAL ARM RAISE
Data processing / analysis

- RSM average requested
- Normalised
- Averaged over three repetitions
- Repeated measures ANOVA ($p \leq 0.05$)
Bar graph showing abdominal muscle activity levels from Baseline to right leg drop out

- **Left IO decreased** (p=0.667)
- **Right IO increased** (p=0.185)
- **Left EO increased** (p=0.05) *
- **Right EO increased** (p=0.356) *
Bar graph showing abdominal muscle activity levels from Baseline to arm raise

- **Left IO increased** (p=0.013) *
- **Right IO increased** (p=0.03) *
- **Left EO increased** (p=0.011) *
- **Right EO increased** (p=0.007) *
Bar graph showing leg muscle activity levels from Baseline to leg drop out

- Left hams decreased (p=0.742)
- Right hams decreased (p=0.001) *
- Left quads increased (p=0.091)
- Right quads increased (p=0.001) *

<table>
<thead>
<tr>
<th>Condition</th>
<th>Left ham</th>
<th>Right ham</th>
<th>Left Quad</th>
<th>Right Quad</th>
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<tbody>
<tr>
<td>Baseline</td>
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<td>Leg Drop</td>
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Bar graph showing leg muscle activity levels from Baseline to arm raise

<table>
<thead>
<tr>
<th>Condition</th>
<th>Ave SEMG (mV)</th>
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<tr>
<td></td>
<td>Left ham</td>
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<td>baseline</td>
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<td>arm raise</td>
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Left hams increased (p=0.018) *
Right hams increased (p=0.065)
Left quads increased (p=0.016) *
Right quads increased (p=0.002) *
Conclusions

• Clinical relevance
• Abdominals
• Role of increased leg activity
  – Normal stabilising
  – Abnormal compensation
Limitations

- Small sample
- Quality of PPT
- Evaluation of back extensors
QUESTIONS?