SPATIALLY DEFINED MOTOR DEFICITS IN PEOPLE WITH UNILATERAL COMPLEX REGIONAL PAIN SYNDROME

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BACKGROUND

A building body of evidence demonstrates spatially defined deficits in people with upper limb Complex Regional Pain Syndrome (CRPS). That is, thermoregulation and tactile processing are both disrupted according to where the hand is relative to the body midline. Here we wished to determine whether this midline effect also impacts on motor performance.

AIM: To determine whether motor accuracy and coordination is disrupted in people with unilateral upper limb CRPS, in a spatially defined manner.

OBJECTIVES: To investigate and compare the accuracy and coordination of simple motor tasks performed on the ipsilateral (or usual) and contralateral side of the body midline.

RESULTS

EXPERIMENT 1: CIRCLE DRAWING TASK

Thirteen participants with CRPS Type 1 of one upper limb completed two motor experiments in random order.

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Participants performed a circle drawing task that primarily tested motor accuracy and coordination of simple motor tasks performed on the ipsilateral (or usual) and contralateral side of the body midline, with eyes open or closed)

EXPERIMENT 2: BUTTON PRESSING TASK

Participants performed a rapid button pressing task that tested motor coordination. They were asked to press the button as often as they wished to determine whether this midline effect also impacts on motor performance.

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METHODS

Thirteen participants with CRPS Type 1 of one upper limb completed two motor experiments in random order.

EXPERIMENT 1: CIRCLE DRAWING TASK

Participants performed a circle drawing task that primarily tested motor accuracy. Participants were asked to draw 20 consecutive circles under eight different and randomly ordered conditions (each upper limb, on either side of the body midline, with eyes open or closed).

FIG 1: PRIMARY OUTCOMES FOR EXPERIMENT 1

‘Drift’ was calculated by measuring the horizontal component of the distance (mm) from the starting point (x.) to the finishing point (x.).

FIG 2: CIRCLE DRAWING

Visual representation of Error and Drift for the affected (A & B) and healthy limb (C & D), on the affected (A & C) and the healthy side of space (B & D).

Error is represented as the mean difference between the inner and outer radii with the inner radius constant. For Drift, SD (error bars) is shown.

*p<0.001 for Error
*p<0.001 for Drift
*p<0.05 for Drift x Side x Vision

EXPERIMENT 2: BUTTON PRESSING TASK

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RESULTS

EXPERIMENT 1: CIRCLE DRAWING TASK

Motor accuracy was calculated by measuring the distance between the second innermost and second outermost circle at each point of the compass (A + B + C + D) (mm), and averaging them.

‘Drift’ was calculated by measuring the horizontal component of the distance (mm) from the starting point (x.) to the finishing point (x.).

FIG 3: BUTTON PRESS – COUNT

Mean number of button presses in 20 seconds [error bars = SD; *p<0.001]

FIG 4: BUTTON PRESS – VARIABILITY

SD of the interval (sec) between button presses [error bars = SD; *p<0.005]

CONCLUSIONS

A spatial bias towards the healthy side of the body midline was evident for upper limb motor tasks performed by participants with CRPS. The results suggest that the midline-centred dysfunction in the processing of tactile input and the regulation of temperature that is present in this population also extends to movement performance. This finding provides further support for the concept of ‘somatospatial’ neglect in people with CRPS. Further investigation of therapies that target the interdependent relationship between spatial and bodily representations in CRPS is warranted.

TABLE 1: BASELINE CHARACTERISTICS

<table>
<thead>
<tr>
<th>BASELINE CHARACTERISTICS</th>
<th>PARTICIPANTS (n=13)</th>
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<tbody>
<tr>
<td>Age (yrs)</td>
<td>[mean (SD)]</td>
</tr>
<tr>
<td>Gender (F:M)</td>
<td>6:7</td>
</tr>
<tr>
<td>Dominant limb (RL)</td>
<td>11:2</td>
</tr>
<tr>
<td>Duration of CRPS</td>
<td>50-150 wks</td>
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<tr>
<td>Pain over past 2 days</td>
<td>4.9 (1.4)</td>
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