Passive intervertebral motion tests for diagnosis of lumbar segmental instability

Description

Clinical assessment of spinal segmental motion involves two major constructs: quantity of motion (displacement), and stiffness (or the force-displacement relationship) (Maher 1998b).

Reliability: Reliability of segmental motion tests has been controversial, due in large part to serious flaws in the design of many of the studies in the literature (Abbott 2005). There is some evidence of adequate reliability (Lundberg and Gerdle 1999, Strender 1997), but other studies conflict (Johansson 2006).

Validity: Two recent studies indicate moderate validity of manual assessment of intervertebral displacement (Abbott 2005, Fritz 2005a). Both indicate that passive accessory intervertebral motion (PAIVM) testing has adequate specificity (81–89%) but low sensitivity (29–46%) for detecting excessive sagittal translation displacement. Passive physiological intervertebral motion (PPIVM) testing was found to be highly specific (99% for flexion, 98% for extension) but with low sensitivity (5% and 16% respectively) (Abbott 2005). In vivo study of force-displacement is technically challenging, to say the least, with studies using parallel or proxy measures of stiffness indicating a moderate degree of validity (Maher 1998a).

Accuracy of PAIVMs for diagnosis of excessive sagittal translation.

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<th>Sensitivity (95% CI)</th>
<th>Specificity (95% CI)</th>
<th>LR+ (95% CI)</th>
<th>LR– (95% CI)</th>
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<tbody>
<tr>
<td>Abbott (2005)</td>
<td>0.29 (0.4 to 0.50)</td>
<td>0.89 (0.83 to 0.93)</td>
<td>2.5 (1.15 to 5.5)</td>
<td>0.81 (0.61 to 1.06)</td>
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<td>Fritz (2005)</td>
<td>0.46 (0.30 to 0.64)</td>
<td>0.81 (0.60 to 0.92)</td>
<td>2.4 (0.93 to 6.4)</td>
<td>0.66 (0.44 to 0.99)</td>
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Accuracy of PPIVMs for diagnosis of excessive sagittal translation.

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<tr>
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<tr>
<td>Abbott (2005)</td>
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<tr>
<td>Flexion PPIVMs</td>
<td>0.05 (0.01 to 0.22)</td>
<td>0.995 (0.97 to 1.00)</td>
<td>8.73 (0.57 to 134)</td>
<td>0.96 (0.88 to 1.05)</td>
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<tr>
<td>Extension PPIVMs</td>
<td>0.16 (0.06 to 0.38)</td>
<td>0.98 (0.94 to 0.99)</td>
<td>7.07 (1.7 to 29)</td>
<td>0.86 (0.71 to 1.05)</td>
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PAIVMs = passive accessory intervertebral motion tests, PPIVMs = passive physiological intervertebral motion tests, LR+ = likelihood ratio for a positive test, LR– = likelihood ratio for a negative test.

Commentary

Despite the widespread use of manual physical assessment of lumbar spinal segmental mobility, the validity of these methods for assessing magnitude of motion has not, until recently, been tested. The study by Fritz (2005a) provides rigorous independent validation of the results of Abbott (2005) as, despite differing methodology and populations, their results were highly consistent. The studies are complementary: one study was an inception cohort conducted in a primary care setting, with low prevalence of segmental instability (Abbott 2005); the other was a smaller cohort assembled in tertiary care, and which had been through several filters – a primary care filter referring to specialist care, and then the specialist referral to radiology with suspicion of instability – and therefore much higher prevalence (Fritz 2005a). The concuring results indicate that the validity of these tests is stable across a wide spectrum of the condition.

It is important to note that these results are delimited to quantity of displacement – not stiffness – and therefore represent only a proportion of the construct of segmental instability. Information on the validity of stiffness assessment helps complete this picture. When taken in the context of growing evidence supporting the predictive validity of these assessments (Childs 2004, Flynn 2002, Fritz 2005a, Hicks 2005), these studies indicate that manual physical assessments of lumbar segmental motion are valid components of an evidence-based clinical examination.

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References