A new functional test in the diagnostic evaluation of neurogenic intermittent claudication

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SUMMARY  A new functional test using downhill walking is described and evaluated in relation to the myelographical examination in 23 consecutive patients with neurogenic intermittent claudication. Discomfort and changes of the neurological status, emerging during the walk, were accepted as test results. They were noted in a decision matrix and the positive and the negative predictive values (PPV and NPV, respectively) calculated. The PPV of any symptom or any deterioration of the neurological status, resulting from this test as signs of a myelographical abnormality, was calculated to be 86 and 89 per cent, respectively, the corresponding NPV's being 50 and 40 per cent, respectively. The NPV of these parameters as signs of a myelographically verified lumbar spinal stenosis was calculated to be 100 per cent, the corresponding PPV's being 38 and 44 per cent, respectively. The development of "symptom-march" or of bilateral neurological signs during the walk was found to be of approximately the same diagnostical value. We conclude, that this function test may serve as a screening procedure in patients complaining of neurogenic intermittent claudication.

Key words: Functional Test, Diagnosis, Neurogenic Intermittent Claudication, Lumbar Spinal Stenosis.

INTRODUCTION

Functional testing as a part of the diagnostic evaluation of patients with suspected lumbar spinal stenosis (LSS) was introduced by van Gelderen (1) in 1948. Since then it has been used either by means of a bicycle (2,3,4) or a horizontally placed treadmill (5,6,7). The result of these functional tests (FT's) has been expressed as an aggravation of the patient's pain (1-7) or as a deterioration of the neurological status after the test (5,6,8).

Neurogenic intermittent claudication (NIC) is the characteristic, but not pathognomonic symptom complex of LSS (9,10). It is closely related to physical activity and thus, it would be logical to perform an FT in patients complaining of NIC. Possibly due to the somewhat disappointing results obtained with the known tests (3,5,6,8) they do not seem to be generally used. A treadmill test, however, has been propounded (6), which is supposed to improve the results.

The purpose of this study was to describe a new FT designed in accordance with the propositions of Lie et al. (6) and to evaluate it in a group of patients with NIC in relation to the myelographical examination.

MATERIAL AND METHODS

Twenty-three consecutive and cooperative patients complaining of NIC, 10 females and
13 males with a median age of 55 years (23-72), participated in this study. They were only included if a lumbar myelography was indicated as judged by the overall clinical status alone and if no other malady compromising their walking ability was found. NIC was defined as pain and/or paraesthesia in one or both legs exaggerated by physical activity and relieved by rest and/or flexion of the lumbar spine. The increasing discomfort during activity should be accompanied by "symptom-march", i.e. an extension of the symptom area in the lower extremities. The median duration of symptoms was 8 months (1-60), and they were reported unilateral in 14 cases and bilateral in 9 cases.

The rear end of a treadmill was elevated to create a 10 degree downward slope in the walking direction to exaggerate the lumbar lordosis of the tested subject. This diminishes the square area of the spinal canal (11). The walking speed was fixed at 1.8 km/h and the walking time at a maximum of 15 minutes, but shortened according to the symptoms of the tested person. Before and immediately after the walk a conventional neurological examination of muscle power, deep tendon reflexes and pin-prick sensibility was performed in that order by the same examiner. Muscle power was not quantified. As signs of a root compression at the upper lumbar intervertebral spaces we included a paresis of hip flexion and/or knee extension, a diminished patellar reflex and hypalgiesia in the upper lumbar dermatomes as defined elsewhere (12). As signs of an L5 root compression we accepted a paresis of foot dorsal flexion, great toe extension and/or extension of the lateral toes, a weakened hamstring reflex (13) and hypalgiesia in the L5 dermatome (12), and as signs of an S1 root compression we acknowledged a paresis of foot plantar flexion, an abnormal Achilles tendon reflex and hypalgiesia in the S1 dermatome. Symptoms developing during the walk and the neurological status at rest and after the test were recorded. The FT was considered positive if the neurological status changed as a result of the walk and negative if no such change occurred.

A functional myelography (11) was done in all patients and evaluated as previously reported (11,14). The radiologists did not know the result of the FT. In 8 cases an LSS was diagnosed, in 4 patients a lumbar disc herniation (LDH) was seen and in 7 cases other abnormalities, i.e. deficient root sleeve filling and bulging discs, were found. In 4 cases no abnormalities were disclosed. At the time of this study a CT-scanner was not available in our hospital. The results of the FT and the myelographies were noted in a decision matrix as earlier reported (13) and the positive predictive value (PPV) and the negative predictive value (NPV) calculated. The PPV expresses the percentage of patients with abnormal myelograhical findings among the patients with a positive FT. The NPV expresses the percentage of patients with normal myelograhical findings among the patients with a negative FT.

Table I: The result of the functional test vs. the myelographical diagnosis

<table>
<thead>
<tr>
<th>The result of the FT</th>
<th>Myelographical diagnosis</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LSS</td>
<td>LDH</td>
</tr>
<tr>
<td>Positive</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Negative</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>4</td>
</tr>
</tbody>
</table>

Abbreviations: see text.