Neurological examination identified 61% of patients with focal cerebral hemisphere lesions but without obvious focal signs

Anderson NE, Mason DF, Fink JN, *et al*. Detection of focal cerebral hemisphere lesions using the neurological examination. *J Neurol Neurosurg Psychiatry* 2005;**76**:545–9.

Clinical impact ratings Neurology ★★★★★★☆

Q In patients with neurological symptoms but without obvious focal signs, how well does a clinical neurological examination identify those with a focal cerebral hemisphere lesion?

METHODS

Design: blinded comparison of a clinical neurological examination with imaging studies.

Setting: university hospital in Auckland, New Zealand.

Patients: 65 patients who were referred for investigation of neurological symptoms, such as headache or transient neurological events, without obvious focal signs. Patients with obvious focal signs, cognitive impairment, brain stem or cerebellar lesions, movement disorders, non-neurological disorders that would affect assessment, or a marked midline shift on imaging were excluded. 46 patients, aged 21–83 years (mean 51 y, 61% men), had a single cerebral hemisphere lesion and 19 patients had no lesion.

Description of test: a clinical neurological examination, consisting of 23 motor signs in the upper and lower limbs, 12 sensory signs, 3 cranial nerve signs, and 9 cognitive tests, was administered {by a neurologist or senior neurology registrar}*. From these results, the examiner {used clinical judgement}* to conclude whether or not there was a focal lesion and, if so, which side was affected. The examiner was blind to the imaging results and the clinical history.

Diagnostic standard: computed tomography and/or magnetic resonance imaging performed before study entry.

Outcomes: sensitivity, specificity, and positive and negative likelihood ratios.

*Information provided by author.

MAIN RESULTS

Only 4 of the individual tests had sensitivity >25%: finger rolling (33%, 95% CI 21 to 47), upper motor neurone weakness in the arms (30%, CI 19 to 45), rapidly alternating movements of the hand (30%, CI 19 to 45), and cognitive constructional ability (30%, CI 19 to 45). Specificity of the individual tests ranged from 74–100%. Overall, the neurological examination accurately identified 61% of patients with a focal lesion, with a 16% false positive rate (table). The side of the lesion was correctly identified in 96% of cases.

CONCLUSION

In patients with neurological symptoms but without obvious focal signs, a neurological examination, consisting of a battery of 47 clinical tests, had moderately good sensitivity and specificity for identifying patients with a focal cerebral hemisphere lesion.

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Commentary

Although most neurologists know (or strongly believe) that the neurological examination is a valuable and inexpensive diagnostic tool, few have attempted to study its component parts using known standards of test assessment. Reducing the Babinski sign to a 2 × 2 table may appear unthinkable to some, but the study by Anderson *et al* proves that it can be done and has at least 3 important implications.

Firstly, in the absence of other information, examination elements by themselves have low sensitivity and high specificity. In fact, the best of our individual ''tests'' correctly identifies focal hemispheric lesions only 25–30% of the time. Seasoned neurologists implicitly know this and improve the sensitivity in several ways: taking a careful history (the most important), combining multiple examination elements (diagnostic tests in parallel), and using other diagnostic tests (eg, neuroimaging).

Secondly, this study highlights the potential usefulness of the forearm or finger-rolling test to uncover subtle upper motor neurone weakness.[1] These tests are not taught routinely as part of the neurological examination, yet they performed as well as, and possibly better than, pronator drift testing. These ''rolling'' tests require patients to rapidly rotate 1 forearm (or index finger) around the other in front of their torso. An abnormal test occurs when there is decreased rotation contralateral to the side of the lesion, manifesting itself as the ipsilateral arm orbiting around the paretic arm.

Finally, this study should stimulate further work to better define and study the heuristics of the master clinician for common neurological conditions—those simplified rules that allow for efficient gathering of information (history and examination) to optimise sensitivity and specificity for the neurological ''encounter.'' This would truly represent the merging of expert-based and evidence-based medicine.

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1 Sawyer RN Jr, Hanna JP, Ruff RL, *et al*. Asymmetry of forearm rolling as a sign of unilateral cerebral dysfunction. *Neurology* 1993;**43**:1596–8.

Diagnostic properties of a neurological examination for predicting the presence of a focal cerebral hemisphere lesion*

Sensitivity (95% CI)	Specificity (CI)	+LR	−LR
61% (45 to 75)	84% (60 to 97)	3.86	0.46

*Diagnostic terms defined in glossary. Numbers calculated from data in article.