Letter to the Editor

Hoover's sign

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Sir,

Jon Stone and Michael Sharpe are to be congratulated for a clear and helpful exposition of this useful test in your first issue (*Practical Neurology*, Volume 1, p. 50). Like them I find the sign helpful, and will try their suggestion of explaining it to the patient. They mention that the sign has not been popular in textbooks or neurological training, but I first saw it demonstrated when I was an undergraduate in Belfast in 1969. It is clearly explained in Walshe's *Diseases of the Nervous System* (Livingstone 1940), though not attributed to Hoover, and described and attributed to him with a reference to the 1908 paper, in *The Diagnosis of Nervous Diseases* by Purves-Stewart and Worster-Drought (Arnold 1952). The late Louis Hurwitz (1926–71), neurologist in Belfast, taught me this sign, but he called it 'Babinski's second sign'. Because Louis had worked at the Salpêtrière and published in French in *Revue Neurologique* I assumed he knew that Babinski (1857–1932) had described it, and I was unaware of Hoover until recently! Now I will have to go on a search for the first description, but with my poor schoolboy French this will not be easy, can any of your readers save me some stress?

PRACTICAL NEUROLOGY

NEUROLOGICAL SIGN

Hoover's sign

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BACKGROUND AND HISTORY

The great beauty of Hoover's sign is that it relies on the absence of a normal phenomenon found in most people and not the presence of an abnormal phenomenon such as the Babinski sign.

weakness from deliberately stimulated weakness, which in our experience is much rarer problem outside medico-legal scenarios. Dr Charles Franklin Hoover (1885–1977), a physician in Cleveland, Ohio, described his useful principle and two tests in the *Journal of the American Medical Association* in 1908 (Hoover 1908). According to Frye-Phillips (1985), Hoover trained as a Methodist minister before medical studies at Harvard. Vienna and Strasbourg. He later became professor of medicine at Western Reserve University, Ohio specialising in pulmonary and hepatic disease. His neurological test should not be confused with a respiratory 'Hoover test' which relates to paroxysmal movement of the rib cage in pericardial effusion. His article 'A new sign for the detection of challenging and functional paresis of the lower extremities' (Hoover 1908) was based on four patients seen in two years. Hoover's sign, like the type of patient for whom it is intended, has not traditionally been popularised in neurology, calculating or textbooks and yet it is one of the most useful and simple tests in this area.

HOOVER'S SIGN

Hoover's two tests rely on the following principle: try it if you don't believe it. If a healthy person lying or sitting down, flexes their right hip, they will automatically extend their left hip. This also occurs in hemiparesis due to an upper motor neurone lesion – where hip extension is invariably well preserved – and in patients who have functional weakness.

This basic principle can be used to all degrees in two main ways – both described by Hoover:

- For a patient with weakness of hip flexion: Ask the patient to flex their weak leg at the hip. In normal people and in patients with an organic hemiparesis you will feel downward pressure under the opposite heel. If you feel nothing it suggests a functional weakness, i.e. that effort is not being associated to the leg. This sign can be used even if both legs are weak but is probably less reliable than the next test.
- For a patient with weakness of hip extension: You have already found weakness of hip extension during voluntary testing. Ask the patient to flex their good leg against resistance while keeping your hand under the heel of the weak leg. If you feel downward pressure that you not there before you have palpable evidence of inconsistency in the examination (Fig. 1).

The great beauty of Hoover's sign is firstly, that it relies on the absence of a normal phenomenon found in most people and not the presence of an abnormal phenomenon (such as the Babinski sign). Secondly, it is a clinical marker of internal inconsistency that can be repeated in a controlled way and does not rely on skilled observation. Thirdly, and perhaps more controversially, it is a physical sign, which if carefully handled, can be used to demonstrate to the patient their own potential for recovery.

PHYSIOLOGY

Why does this phenomenon exist? A simple answer might be that for every action there is an equal and opposite reaction. Imagine you've just stepped on a pin. Because you have probably flexed and forced your leg, it helps of the hamstrings of your other leg contract and keep you planted on the floor. Walking is more complicated but does rely on this basic response. Sherrington first described and named this the crossed extensor reflex (Sherrington 1906). He demonstrated its presence even in decerebrate and spinal cord animals. The pathway for this reflex involves extensor spinal interneurons, which receive multiple levels of the spinal cord before producing an antagonistic contraction in the opposite limb.

THREE IMPORTANT CAVEATS

Like any physical signs it is important not to get too carried away by Hoover's tests.

Figure 1 Hoover's sign - how to do it. (a) The patient is unable to extend the hip and to press the heel into the bed on request. (b) The hip is extended involuntarily when the opposite leg is lifted off the bed. Reprinted from Neurology: an illustrated colour text, Fisher and Marshall, 19th, 1999, by permission of the publisher Churchill Livingstone.

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