TEACHING CASE REPORT

Through the looking glass: persistent mirror movements

The Case: A 21-year-old man presented to our neurology clinic with persistent mirror movements of his hands. He was a soldier, but he had been banned from handling firearms by his superior officers, who were fearful that the man would cause an ammunition- or firearm-related accident because of the tendency for either of his hands to mirror the actions of the active limb (see video available at www.cmaj.ca/cgi/content/full/176/5/619/DC1). For example, when the patient flexed the fingers of his right hand, the fingers of his left hand would show similar but more subtle movements.

The patient's relatively subtle mirror movements had started during childhood and had not previously caused any functional problems. The patient was well on presentation, and his history was unremarkable. The results of his physical examination were normal, and he had no tremors, hypo- or hyperkinetic movements or abnormal posturing. An MRI scan of the brain appeared normal, as were the results of thyroid function, electroencephalography, nerve conduction, brain-stem and visual-evoked response tests. Transcranial magnetic stimulation (a magnetic field applied to the hemicranium that normally induces contraction of the contralateral hand muscles) evoked movements in both of the patient's hands at the same stimulation threshold. Benign, persistent mirror movements were diagnosed, and the patient was reassured that treatment was not required.

Mirror movements are involuntary and unnecessary movements that accompany voluntary activity in homologous muscles on the opposite side of the body.[1] These movements involve the upper limbs more frequently than the lower limbs and occur when the contralateral limb is moved voluntarily rather than passively. The condition is often a source of embarrassment and inconvenience, but, as in our patient, it is not substantially disabling.

The motor cortex normally sends descending motor signals via the corticospinal tracts, which cross at the level of the pyramids in the brain-stem and descend into the contralateral spinal cord. However, patients with mirror movements have an abnormal connection between the primary motor cortex and both sides of the spinal cord.[1] Overactivation of the ipsilateral motor cortex, abnormal inhibitory connections in the corpus callosum and failure of the corticospinal spinal tracts to decussate (or a combination of these factors) can lead to mirror movements.[1,2]

Mirror movements are benign and, although relatively uncommon, are thought to be normal during infancy and early childhood. Mirror movements usually diminish with age and do not persist beyond 10 years of age.[1] Some adults, similar to our patient, have benign persistent mirror movements. These patients are usually otherwise healthy and have only relatively subtle mirroring that is generally precipitated by complex or effortful tasks.

Pathological conditions associated with mirror movements (Box 1) should be excluded in older children and young adults with severe mirroring, as well as in patients with mirror movements of adult onset. Although usually sporadic, mirror movements can be familial. When mirror movements are observed in adulthood, pathological conditions are usually at the root of the phenomenon. In pathological mirror movements, it is thought that the basal ganglia fail to support non-mirror transmission of motor signals, which results in enhancement of the mechanisms that underlie the subtle mirroring that is seen in children and adults. In adults with mirror movements, thorough clinical examination for known pathological causes of the condition is essential. An MRI scan of the brain and transcranial magnetic stimulation can help to confirm the diagnosis and to exclude organic pathology.

Box 1: Pathological conditions associated with mirror movements[1,3]

Common associations

- Dystonia
- Parkinson's disease
- Stroke
- Focal lesions involving the supplementary motor cortex
- Behavioural disorders

Uncommon associations

- Usher's syndrome
- Kallmann's syndrome
- Klippel-Feil syndrome
- Phenylketonuria
- Friedreich's ataxia
- Schizophrenia
- Agenesis of the corpus callosum

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