

Picture Quiz: Answer

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AFB Alsawaf & R Sivakumar

Answers

1. The MRI scans show a small localised area of high intensity in the left hemisphere (Figures 1 and 2)
2. The abnormality is in the left precentral gyrus, an area of the brain often described as the 'hand knob' area, as it plays a significant role in the control of hand movement.
3. The likely cause is an acute cerebral infarct.
4. The patient should be started on secondary prevention medication for cerebral infarction including a statin and antiplatelet therapy.

Discussion

While peripheral lesions account for a significant proportion of cases presenting with isolated motor hand weakness (Box 1), this case illustrates the importance of recognizing infarction of the hand knob area as a cause for such a presentation. An accurate history is essential, along with a detailed systemic and neurological examination performed, particularly looking for other neurological findings that may hint towards a peripheral cause or involvement of more

areas cortically. The presence of weakness of all muscle groups is unusual in peripheral nerve lesions and led in this case to the initial investigation with cerebral MRI, which provided the diagnosis.

The differentiation between central and peripheral causes is essential to help choose the correct treatment modalities. Given the diagnostic challenges with such a presentation, it is imperative that other causes of hand motor weakness are ruled out appropriately. Tests such as Nerve Conduction Studies or EMG can help with the diagnostic process when seeking out a peripheral lesion.

Ever since the concept of homunculus has been put forward, it has been known that the precentral gyrus plays a crucial role in the cortical control of hand movements. Yousry *et al* in 1997 have described the area controlling hand movements as a knob-like, broad based, posterolaterally directed structure in the precentral gyrus.¹ This area is referred to as the 'hand knob' area. They have suggested that it takes the form of an inverted omega (90%) or of a horizontal epsilon (10%) when examined in the axial plane, and it appears as a posteriorly directed hook (92%) when viewed in the sagittal plane.

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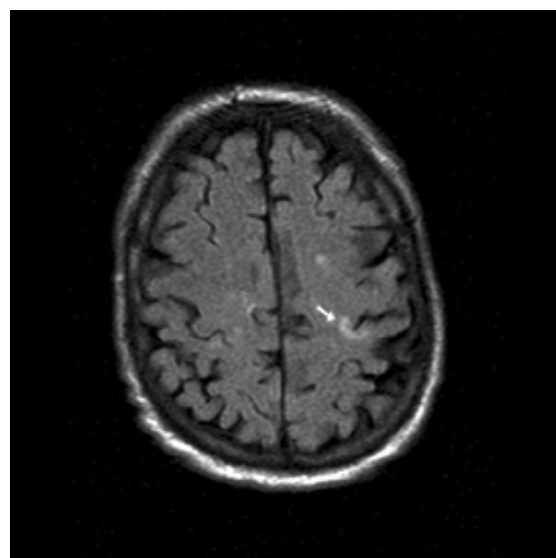


Figure 1. MRI FLAIR sequence showing an area of hyperintensity in the hand knob area of the left hemisphere.

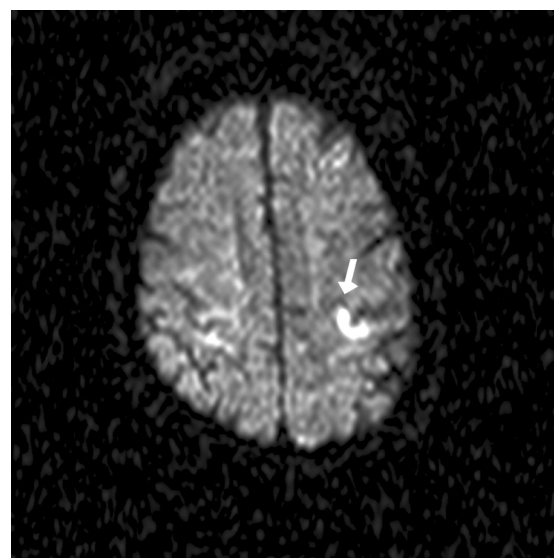


Figure 2. Diffusion weighted MRI sequence showing increased intensity in the hand knob area of the left hemisphere confirming acute ischaemia.

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In a retrospective study of 6 patients presenting with isolated hand motor weakness due to cortical infarcts, Chen *et al*² found that weakness in the hand can be uniform (involving all small muscles) or weakness in either Radial (thumb and index) or Ulnar digits (little and ring fingers).

Infarction of the hand-knob area is due to the occlusion of the Rolandic (Central Sulcal) Artery, and is

often due to arterial embolism; cardio-embolic causes and carotid stenosis should be considered. Our patient subsequently underwent 24 hour tape, carotid Doppler and echocardiography, all of which were normal.

Most patients make a good functional recovery after an infarct causing isolated hand weakness infarct.² Our patient regained full use of his hand and remained well when reviewed in clinic subsequently.

Key points:

- Isolated hand weakness is usually due to a peripheral cause
- Cortical strokes of the hand knob motor area can cause isolated hand weakness
- It is important to identify a cortical cause, in order to address secondary prevention
- Detailed history, examination, and the correct investigations are essential to help aid the diagnosis

- Cervical radiculopathy
- Thoracic outlet syndrome
- Lesions of the Median and/or Ulnar nerves.
- Myasthenia Gravis
- Myotonic Dystrophy
- Peripheral motor neuropathy (Paraneoplastic, porphyria, lead poisoning, Charcot-Marie Tooth disease)

Box 1. Common non-central causes of hand motor weakness.

References

1. Yousry TA *et al*. Localization of the motor hand area to a knob on the precentral gyrus; A new landmark. *Brain* 1997;**120**: 141–157.
2. Chen P, Hsu H, Wang P. Isolated Hand Weakness in Cortical Infarctions. *J Formos Med Assoc* 2006; **105**(10): 861–865.