WRIST DROP AND FOOT DROP IN CEREBRAL CORTICAL LESIONS

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Introduction

It is well known that weakness may affect one limb only if the appropriate area of the motor cortex or its projection pathway is selectively damaged. Lesions involving the motor cortex are noted for the circumscribed paresis to which they give rise [1]. The diagnosis and localisation of such lesions may be easy when there is increase in tone, brisk tendon reflexes and Babinski sign in the presence of spastic foot drop [2]. However, there are difficulties in clinical recognition of central origin of such precise motor weakness, especially when it appears to follow the distribution of peripheral nerves [3]. I report 3 cases with cerebral cortical lesions who were suspected to have peripheral nerve lesions at the time of initial presentation. Relevant literature is briefly reviewed.

Case Report

Case 1

A 19-year-old male had a fall and sustained head injury. There was no loss of consciousness. About 2 hours later, he complained of headache and weakness of right wrist dorsiflexion. Clinically, he had right wrist drop with grade 0/5 power in wrist extensors. Tendon jerks were normal and there was no sensory impairment. Nerve conduction studies were normal. CT brain revealed a small region of haemorrhagic contusion over the midconvexity region of left frontal lobe (Fig 1). He showed gradual improvement and regained complete power over the next 4 weeks.

Case 2

A 34-year-old male was admitted with 3 week history of inability to dorsiflex his left foot. Clinically, he had grade 0/5 power in ankle dorsiflexors and grade 4/5 power in the calf on the left side, with brisk knee and ankle jerks on that side. There was no sensory impairment. Plantar response was equivocal. Lumbar spine radiograph and dorsolumbar myelogram were normal. Nerve conduction studies and electromyography did not reveal any abnormality. CT of the brain revealed a parasagittal meningioma on the right side (Fig 2). The tumour was completely excised by craniotomy, and there was gradual recovery in his foot drop over the next 6 weeks.

Fig. 1 : NCCT brain showing small contusion over the midconvexity region of left frontal lobe.

Fig. 2 : CECT brain showing right parasagittal meningioma.

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Fig. 3 : NCCT brain showing bilateral parasagittal cortical contusion.

Case 3.

A 19-year-old male had a fall from a tree and struck his head on the ground. There was transient loss of consciousness followed by recovery. He however complained of weakness of both feet and was unable to pass urine. Clinical examination revealed grade 1/5 power in ankle dorsiflexors and grade 1/5 power in the calf muscles. Knee and ankle jerks were present and plantars were equivocal. There was no sensory impairment. Bladder was catheterised and intravenous methylprednisolone was administered with a suspicion of spinal cord injury. Dorsolumbar spine radiographs were normal. CT brain showed bilateral parasagittal haemorrhagic cortical contusion (Fig 3). He was managed conservatively and showed gradual recovery over the next 6 weeks.

Discussion

Brain localisation studies of motor cortex using electrostimulating techniques have precisely determined the somatotopic localisation of the ankle and toe in the parasagittal region, while the hand and wrist are represented over the convexity [4]. Although the possibility of a foot drop occurring due to cortical lesions has been stated to be more theoretical than real because "no well documented cases are reported" [5], it is now certain that a strategically placed cortical lesion may produce weakness of wrist or ankle dorsiflexion, clinically masquerading peripheral nerve lesion.

Brain tumours in the parasagittal area may cause isolated spastic paraparesis by compressing the leg areas of the motor cortex in both the hemispheres [1]. Mesial parasagittal rolandic lesions can manifest as pseudoperoneal palsy in the form of weak dorsiflexion of the ankle [3]. Paracentral paraplegia with bilateral involvement of mesial paracentral lobules may manifest as weakness of both lower limbs, most marked distally. There may be neurogenic bladder dysfunction. Eskandary et al [6] reported 6 such cases of foot

drop due to brain lesions. While 4 of these had parasagittal tumours, head injury and demyelination accounted for the remaining two. In 3 of these cases, foot drop was the initial presentation. Lath and Rajshekhar [7] reported one case of foot drop due to parasagittal meningioma, who had earlier undergone lumbar disc surgery with a diagnosis of prolapsed disc.

Dorsal convexity rolandic deficits can occur in the form of isolated digit palsy. The thumb and index finger may become weak in a lesion of middle convexity region of the motor strip and mimic ulnar nerve palsy [8]. Pseudoradial palsy with weakness most marked in the extensors of the hand and fingers, but excluding the small hand muscles may be seen in a convexity lesion.

It may be difficult to localise the lesion causing wrist drop or foot drop to cerebral cortex. Careful neurological examination may reveal presence of hyper-tonia, brisk tendon reflexes and extensor plantars along with absence of sensory impairment. Presence of muscle wasting is a feature of peripheral nerve lesions, although such wasting may also be seen in upper motor neuron lesions [9].

The normal function of upper motor neuron pathways in man is to interrupt the reflex standing (anti-gravity) pattern of muscle contraction so as to mediate voluntary movement. For this reason, disturbances of upper motor neuron function leads to typical distribution of weakness, since support is withdrawn from extensor synergy in the upper limb and from flexor synergy in the lower limb [10]. Clinically, the posture obtained due to wrist drop and foot drop in cortical lesions is some what similar to that which forms part of the picture of hemiplegia and this should be viewed in the above mentioned context as withdrawal of synergy and not just isolated muscle paralysis.

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