CASE REPORT

Reversible Holmes' tremor due to spontaneous intracranial hypotension

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SUMMARY

Holmes' tremor is a low-frequency hand tremor and has varying amplitude at different phases of motion. It is usually unilateral and does not respond satisfactorily to drugs and thus considered irreversible. Structural lesions in the thalamus and brainstem or cerebellum are usually responsible for Holmes' tremor. We present a 23-year-old woman who presented with unilateral Holmes' tremor. She also had hypersomnolence and headache in the sitting posture. Her brain imaging showed brain sagging and deep brain swelling due to spontaneous intracranial hypotension (SIH). She was managed conservatively and had a total clinical and radiological recovery. The brain sagging with the consequent distortion of the midbrain and diencephalon was responsible for this clinical presentation. SIH may be considered as one of the reversible causes of Holmes' tremor.

BACKGROUND

Spontaneous intracranial hypotension (SIH) typically presents with orthostatic headache. However, some unusual manifestations have been reported, including galactorrhoea, labyrinthine hydrops, upper limb radiculopathy, coma, encephalopathy, parkinsonism, ataxia, bulbar weakness, frontotemporal dementia, gait disorder and chorea.^{1 2} We report one more rare manifestation of this intriguing disorder-Holmes' tremor. To our knowledge, this is the first report of this interesting movement disorder caused by SIH.

CASE PRESENTATION

A 23-year-old woman presented with 7 months history of insidious onset, gradually progressive tremors in the right hand, present at rest as well as during holding objects. Simultaneously, she noted headache and excessive sleepiness in the sitting position with good improvement in the recumbent state. Five years ago, she had sustained a brain injury in a road traffic accident. She was referred to us as a probable case of brainstem glioma. On examination, her vital parameters were normal. She was somnolent with a tendency to doze off even during interview. There was pupillary light-near dissociation and upgaze restriction. A coarse 3–5 Hz, irregular amplitude tremor was noted in the right upper limb. There was postural, intention and kinetic accentuation of the tremor amplitude.

INVESTIGATIONS

Her routine laboratory investigations were within normal limits. MRI showed sagging of the brain with transtentorial descent of diencephalon and third ventricle, leading to deep brain swelling and complete obliteration of the perisellar and interpeduncular cisterns (figure 1A). In addition, there was swelling and deformation of the midbrain, being elongated in its anteroposterior diameter and compressed by the temporal lobes on either side due to uncal herniation (figure 1B). These radiological features were diagnostic of intracranial hypotension. The structural alteration of the brainstem was more over the left side. The fractional anisotropy (FA) and apparent diffusion coefficient (ADC) values over the right midbrain tegmentum were 0.69 and $0.85 \times 10^{-3} \text{ mm}^2/\text{s}$, respectively, whereas the corresponding values over the left midbrain tegmentum were 0.46 and $0.91 \times 10^{-3} \text{ mm}^2/\text{s}$. Similarly, the FA and ADC values over the right superior cerebellar peduncle were 0.41 and $0.87 \times 10^{-3} \text{ mm}^2/\text{s}$, respectively and the corresponding values over the left superior cerebellar peduncle were 0.36 and $0.93 \times 10^{-3} \text{ mm}^2/\text{s}$. MRI of the spine was within normal limits.

TREATMENT

She was managed conservatively with proper hydration and maintenance of Trendelenburg position. She had significant clinical improvement with complete relief from somnolence and rest tremor and a mild persistent kinetic and postural tremor after a week. A repeat MRI 1 week after the initiation of treatment showed significant improvement in the brainstem deformity (figure 1C and D). At 3 months follow-up, she became asymptomatic with complete resolution of orthostatic headache, hypersomnolence and tremor.

DISCUSSION

In 1904, Gordon Holmes first described Holmes' tremor as a 3–4 Hz flexor-extension oscillation, present at rest and worsened with posture and action.³ In 1998, the Consensus Statement of the Movement Disorder Society on Tremor defined Holmes' tremor as a rest and intention tremor with irregular amplitude.⁴ Holmes' tremor is usually of symptomatic origin. Structural lesions in the thalamus, brainstem or cerebellum are known to produce this tremor. A double hit is required for this clinical phenomenon to occur, one lesion involving the dopaminergic nigrostriatal system

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Figure 1 T2 weighted (T2W) mid-sagittal image (A) demonstrates severe brain sagging with diencephalic and deep brain swelling (arrow) causing obliteration of the perisellar and interpeduncular cisterns; T2W axial image (B) shows distorted midbrain anatomy with anteroposterior elongation (left more than right) (arrow). There was significant improvement in these imaging findings (C and D) after treatment (arrows).

and the other involving the dentate-rubro-olivary pathways or the cerebello-thalamo-cortical pathways.^{5–8} Vascular lesions are considered the most common cause for Holmes' tremor.⁹

The most disappointing aspect of Holmes' tremor is its irreversible nature since pharmacological intervention is generally not promising. The resting component of the tremor could respond to levodopa or dopaminergic agonists.¹⁰ Isolated reports of good response of Holmes' tremor to levetiracetam and zonisamide are also available.^{11–12} Spontaneous disappearance of Holmes' tremor was reported in a patient with a midbrain cavernous hemangioma.¹³ Reversal of bilateral Holmes' tremor with the correction of blood glucose levels was reported in non-ketotic hyperglycaemia.¹⁴ Stereotactic thalamotomy and deep brain stimulation in ventralis intermedius nucleus have also been shown to be useful in controlling Holmes' tremor.^{15–16} We thus present another unique situation of reversible unilateral Holmes' tremor in the setting of SIH.

The typical MRI features of SIH include sagging of the brain, dilatation of dural sinuses and cerebral veins, postcontrast enhancement of the thickened dura and subdural collections. However, as typified by our case, some patients may also present differently with deep brain swelling affecting the mesencephalic and diencephalic structures.¹⁷ This is due to severe dragging of the brain through the tentorial notch. They lack the more classical features of SIH, namely postcontrast dural enhancement and subdural collections. This presentation is either due to impaired drainage of the deep venous system or its engorgement occurring to compensate for the loss in cerebrospinal fluid volume.

The distortion of the midbrain and diencephalic anatomy explains the clinical presentation in our patient, greater involvement of the left side accounting for the contralateral tremor. The reduced FA and increased ADC values over the left midbrain tegmentum and superior cerebellar peduncle may suggest significant functional disruption of the underlying pathways including the nigrostriatal and the cerebello-thalamo-cortical systems. Orthostatic hypersomnolence in our patient can be explained by increased pressure over the wakefulness promoting structures mainly posterior hypothalamus and the thalamus in the upright position. Since she had a rapid clinical and radiological improvement, we did not proceed further to demonstrate the site of cerebrospinal fluid (CSF) leak.

The clinical presentation of our patient with unilateral tremor was hard to differentiate from the classical Holmes' tremor arising from a brainstem structural lesion. The postural variation of the associated symptoms was the only clue. The MRI picture of brain sagging and swelling without subdural collections or postcontrast dural enhancement further strengthened the referring physician's suspicion of a brainstem glioma. However, the rapid reversal of the clinical and radiological features confirmed the diagnosis of SIH. Our case highlights the need for a high degree of suspicion of a reversible aetiology like SIH when somebody presents with Holmes' tremor.

Learning points

- ▶ Holmes' tremor can be one of the rare presenting manifestations of spontaneous intracranial hypotension (SIH).
- ▶ SIH can sometimes lack classical features in MRI like subdural collections and postcontrast dural enhancement and present only as brainstem swelling simulating a tumour.
- ▶ Holmes' tremor is not always irreversible. Reversible aetiologies like hyperglycaemia and SIH should also be considered while evaluating this clinical phenomenon.

Contributors RSI conceived the idea and designed the paper. PW contributed in the discussion and final draft of the paper. BT contributed in discussion of imaging studies and clinical correlation.

Competing interests None declared.

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