

LETTER TO THE EDITOR

Dropped Head Syndrome after Minor Trauma in a Patient with Levosulpiride-Aggravated Vascular Parkinsonism

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Dropped head syndrome (DHS) is commonly observed in patients with parkinsonism, including those with multiple system atrophy and Parkinson's disease (PD). In PD, DHS is aggravated during off period or develops after the introduction of dopamine agonists (DAs).¹ Although DHS is considered as dystonia by some authors, clinical and laboratory findings supporting this view remain controversial.² Herein, we describe the emergence of levosulpiride-aggravated DHS in a patient with vascular parkinsonism (VP) after minor trauma.

A 78-year-old female was admitted due to involuntary neck flexion. Her medical history revealed hypertension and atrial fibrillation. Ten days prior to admission, she visited our clinic with gait disturbance. Her first neurological examination revealed mild kyphosis and symmetric lower body parkinsonism [Unified Parkinson Disease Rating Scale Part III (UPDRS III) = 17]. She was unable to stand unassisted. Resting tremor and other atypical features, such as downward gaze impairment, were absent. The patient had been taking levosulpiride for over 3 months. Her parkinsonism had begun to improve after the discontinuation of levosulpiride. However, 2 days prior to admission, she slipped and fell. She did not lose consciousness, but her face and neck hit a table as she fell, and involuntary neck flexion began the same day. A follow-up neurologic examination upon admission revealed DHS and parkinsonism (UPDRS III = 18). Her Mini-Mental Status Examination score was 20/30, and her DHS could be relieved by lying down. A brain MRI showed multiple lesions in the subcortical and periventricular areas (Figure 1A), and a spine X-ray showed rotoscoliosis and compression fractures of T11 and L1 vertebrae (Figure 1B). Her

cervical MRI was normal. A needle electromyography (EMG) 4 days after the onset of DHS failed to demonstrate dystonic contraction in various muscles, including the sternocleidomastoid, splenius capitis, trapezius, and scalene muscles but showed positive sharp waves (PSWs) in the paraspinal muscles, including splenius capitis, with normal morphology of motor unit action potential without early recruitment. Levodopa was administered (200 mg/day), and the patient's parkinsonism and DHS improved over the course of 1 week (Supplementary Video 1 and 2 in the online-only Data Supplement). Levodopa was tapered 3 weeks later, and DHS did not recur. A follow-up neurologic examination 1 year later revealed mild parkinsonism characterized by postural and gait problems without any evidence of atypical parkinsonism (UPDRS III = 9).

In this patient, parkinsonism was persistent even after the resolution of DHS. Her parkinsonism was lower-body predominant, and extensive vascular lesions were detected via MRI, which is compatible with VP. Because her UPDRS III score improved after the discontinuation of levosulpiride, we concluded that her parkinsonism was aggravated by levosulpiride.

DHS can be caused by weakness of the neck extensors in various disorders, such as myopathy or myasthenia gravis (MG). In this case, myopathy was excluded by EMG. A diagnostic work-up for MG was not performed due to a lack of clinical features suggestive of MG, such as fatigability or diurnal fluctuation. Moreover, the short-lasting clinical symptoms observed were not compatible with MG.

In this case, there was no direct evidence of dystonic contraction. The literature presents conflicting EMG results in cases

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of DHS, including rare reports of abnormal dystonic contraction.² Thus, EMG cannot conclusively prove or disprove the dystonic nature of DHS. In our patient, PSWs provided evidence of preexistent chronic denervation such as radiculopathy.

The role of dopamine receptors in DHS remains controversial. DHS commonly develops after the use of DAs, such as pramipexole, that have a high affinity for dopamine D2 receptor (D2R), suggesting a significant role of D2R in DHS.¹ However, a case of DHS upon D2R blocker (sulpiride) use has been reported.¹ Our case was associated with levosulpiride use; thus, relative over-activity of dopamine D1 receptor (D1R) secondary to D2R blockade could represent an alternative mechanism of DHS.

DAs such as pergolide with an affinity for both D1R and D2R are more weakly associated with DHS, suggesting an imbalance between D1R and D2R stimulation as a mechanism of DHS.¹ Because dopamine stimulates both D1R and D2R, it can restore the balance between D1R and D2R, which was suggested in the present case by the reversal of DHS upon treatment with levodopa.¹

The clinical presentation of our patient consisted of 2 phases: VP aggravation via D2R blockade by levosulpiride and the development of DHS after trauma. Cases of genetic or sporadic dystonia aggravated by trauma have been reported, suggesting a temporal correlation between trauma and DHS.³ However, the link between trauma and dopamine receptor activity is not fully understood. In experimental animals, D1R is up-regulated after concussion, but a similar observation has not been reported for humans.⁴ In this case, although the patient did not lose consciousness, the facial and neck trauma may have been accompanied by minor head trauma. If the trauma experienced by our patient was severe enough to cause an imbalance between dopamine receptors, the delayed appearance of DHS could be the result of combined pre-existing D2R antagonism due to levosulpiride and D1R augmentation due to trauma.

The clinical manifestations of dopamine receptor-blocking drugs are complex. Although D2R is considered a major receptor in the indirect pathway of the basal ganglia loop responsible for slowing movement, levosulpiride, a D2R blocking drug, can induce both hyperkinetic and hypokinetic movement disorders, contrary to the simplified view on the



Figure 1. Imaging studies. A: Brain magnetic resonance imaging shows diffuse periventricular white matter change. B: Spine X-ray shows osteoporosis, rotoscoliosis, and compression fractures.

roles of D1R and D2R.⁵ Many factors can affect the clinical manifestations of dopamine receptor drugs, including various types of dopamine receptors (D1–D5 dopamine receptor), incomplete selectivity, or presynaptic auto-receptors (D2R). Thus, in movement disorders linked to dopamine receptor-blocking drugs, imbalanced or complex interactions among dopamine receptors and drugs may be more important than the selective stimulation of specific dopamine receptors.

Parkinsonism and the stepwise development of post-traumatic DHS have not previously been linked to the same drug. Although our case presented no direct evidence of dystonia, the relationship between DHS and dopamine receptor activity suggests the extrapyramidal nature of DHS.

This study is a single case report; hence, its wider application to all DHS cases is limited. Further studies are needed to investigate the complex interactions among dopamine receptors in DHS.

Supplementary Video Legends

Video 1. The patient dropped her head during gait and while sitting.

Video 2. Dropped head syndrome resolved upon levodopa treatment.

Supplementary Materials

The online-only Data Supplement is available with this article at <http://dx.doi.org/10.14802/jmd.15052>.

Conflicts of Interest

The authors have no financial conflicts of interest.

REFERENCES

1. Oyama G, Hayashi A, Mizuno Y, Hattori N. Mechanism and treatment of dropped head syndrome associated with parkinsonism. *Parkinsonism Relat Disord* 2009;15:181-186.
2. Revuelta GJ, Montilla J, Benatar M, Freeman A, Wichmann T, Jinnah HA, et al. An ¹⁸F-FDG PET study of cervical muscle in parkinsonian anterocollis. *J Neurol Sci* 2014;340:174-177.
3. Gioltzoglou T, Milonas I, Lees AJ. Case of DYT1 dystonia triggered by bite from a moray. *Mov Disord* 2006;21:1536-1537.
4. Henry JM, Talukder NK, Lee AB Jr, Walker ML. Cerebral trauma-induced changes in corpus striatal dopamine receptor subtypes. *J Invest Surg* 1997;10:281-286.
5. Shin HW, Kim MJ, Kim JS, Lee MC, Chung SJ. Levosulpiride-induced movement disorders. *Mov Disord* 2009;24:2249-2253.