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Clinical/Scientific Notes

Focal Myoclonus-Dystonia of the Leg Secondary to a Lesion of the Posterolateral Putamen: Clinical and Neurophysiological Features

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Abstract: We report on a patient with spontaneous and stimulus-sensitive myoclonic jerks and dystonia of the right leg that had been present since infancy. Magnetic resonance imaging showed a linear area of gliosis confined to the left posterolateral putamen. This is the first report of focal myoclonus-dystonia of the lower limb secondary to a putaminal lesion. © 2003 Movement Disorder Society

Key words: myoclonus; dystonia; putamen; basal ganglia; somatotopy; neurophysiology

Hemidystonia alerts the clinician to the possibility of a structural lesion, generally involving the contralateral basal ganglia, particularly the putamen; however, focal dystonia is a rare consequence of such lesions.[1] In contrast, lesions of the contralateral thalamus may cause contralateral myoclonic dystonia.[2,3] We describe a case of focal myoclonus-dystonia due to a small putaminal lesion.

Case Report

A 38-year-old, left-handed woman was referred for management of involuntary movements and abnormal posturing of the right leg and foot that had been present for as long as she could remember. She described sudden jerks of the whole of the right leg that occurred spontaneously and were precipitated by touch and unexpected noise such as someone brushing past her leg or a dog barking in the distance. They were of sufficient force to throw her off balance if standing or walking, but never caused falls or injury. She experienced pain in the upper part of the thigh that was worsened by the jerks. The jerks were abolished during sleep, and she was not aware of any change in the movements with alcohol or caffeine. She was unable to voluntarily suppress them. The abnormal posture interfered with walking and the sole of her right shoe tended to wear down excessively on its medial aspect.

Her mother had a severe scoliosis secondary to Pott's disease of the spine causing her right ribs to impinge on the iliac crest. She was delivered at 36 weeks by caesarean section. Abnormal posturing of the right foot was noted at birth but attributed to the leg being jammed against her mother's ribs in utero. She walked at 10 months of age, and her milestones proceeded normally. As a young child, her father often chided her because her right arm was flexed at the elbow and wrist with the hand hanging anterior to her shoulder, but this had resolved spontaneously by adolescence. There was no history of progression of the movement disorder. Intellectual development was normal, and she had completed a tertiary qualification. There was no family history of neurological disorders.

On examination when supine, the patient tended to hold her right leg with the ankle inverted and plantar flexed, toes flexed. She had irregular spontaneous jerks of the leg at a frequency of approximately 2 to 6 per minute. These consisted mainly of co-contraction of proximal and distal muscles with little displacement of the limb. The most prominent movement was plantar flexion of the toes more than the ankle. On occasion, there was slight flexion or adduction of the hip. The duration of the movements varied from shock-like jerks to spasms lasting several seconds. Jerks were precipitated by lightly touching the foot or leg and by unexpected noise such as a handclap. Her gait was characterised by maximal flexion of the right toes with eversion and slight plantar flexion of the ankle, and the leg had to be lifted higher than the left in swing phase to clear the ground. There was hypertrophy of the right tensor fascia lata and iliopsoas. Tone in the right leg was increased, and the reflexes were symmetrically brisk, but there was no clonus. The plantar response could not be interpreted due to the posture of the foot and toes. Muscle power was normal, although the abnormal posturing of the right foot could be overcome only with difficulty. The remainder of her neurological examination was normal. Segment 1 of the videotape demonstrates dystonic posturing and spontaneous and reflex myoclonus in the right leg.

The right leg was 3 cm shorter and the right foot was one shoe size smaller than the left. There was a mild scoliosis.

Neurophysiological Investigations

Neurophysiological assessment was performed using methods described previously.[4,5] Surface electromyographic (EMG) recordings of spontaneous jerks demonstrated that EMG activity occurred in bursts rather than showing sustained tonic activity. The burst duration was typically 100 to 2,000 msec, with occasional bursts of 50 to 100 msec duration. Figure 1 demonstrates two consecutive bursts, lasting 85 and 1,500 msec, respectively, in the right tensor fascia lata (TFL). The

A videotape accompanies this article.

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right leg muscles were activated near-simultaneously, although the pattern and sequence of activation varied between bursts, with either proximal or distal muscles predominantly involved. On many occasions, there was a synchronous low-amplitude burst in the left TFL, although there was no clinically detectable contraction of the left leg muscles.

The responses to electrical stimulation of peripheral nerves were recorded. The pattern of EMG activity was very similar to the spontaneous jerks, with a similar range of burst durations. After stimulation of the digital nerves of the right second toe at three times sensory threshold (Fig. 2), the onset of activity was in TFL at 84 msec, and flexor hallucis brevis (FHB) at 92 msec. After stimulation of the tibial nerve at the ankle at twitch threshold, the responses were identical to those with stimulation of the toe, with additional activity in FHB at 47 msec compatible with an H reflex. There were no reflex responses in the left TFL.

Somatosensory evoked potentials (SSEPs) were recorded after stimulation of the median and tibial nerves bilaterally. The upper limb responses were normal. The lower limb responses were asymmetrical: after stimulation of the right side the P40 amplitude was 1.4 μV, compared with 3.0 μV with stimulation of the left tibial nerve. The latencies were normal, the positive peak of the P40 was at 40.6 msec on each side. The motor evoked potentials (MEP) after transcranial magnetic stimulation of the motor cortex were normal; the onset latencies were 37.5 msec in FHB and 25.7 msec in tibialis anterior.

Jerk-locked backaveraging of electroencephalographic (EEG) activity was performed, triggering from FHB. There was no EEG correlate of the muscle jerks.

Neuroimaging

Magnetic resonance imaging (MRI) showed a linear area of abnormal signal confined to the posterolateral left putamen, which was of low signal on T1-weighted and increased signal on T2-weighted and proton-density sequences, consistent with gliosis (Fig. 3). The left putamen was atrophic compared with the right. The left internal capsule and globus pallidus were normal. MRI of the spinal cord was normal.

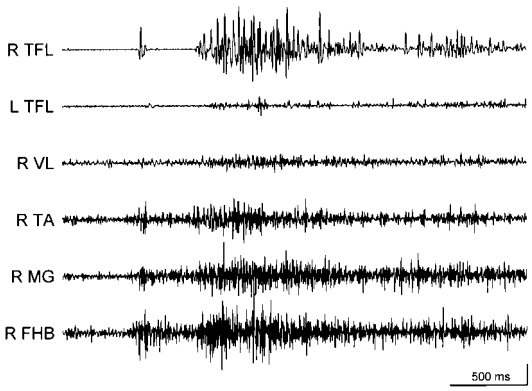

FIG. 1. Electromyographic recording of two consecutive spontaneous right leg jerks. The burst duration was generally 100 to 2,000 msec, with occasional briefer bursts of 50 to 100 msec duration. The right leg muscles were activated near-simultaneously, although the pattern of activation varied between bursts, with either proximal or distal muscles predominantly involved. On many occasions, a low-amplitude burst occurred synchronously in the left TFL, although there was no clinically detectable contraction of the left leg muscles. Vertical calibration: 500 μV (R TFL), 100 μV (L TFL, R VL, R TA), and 200 μV (R MG, R FHB). Abbreviations: R, right; L, left; TFL, tensor fascia lata; VL, vastus lateralis; TA, tibialis anterior; MG, medial head of gastrocnemius; FHB, flexor hallucis brevis.

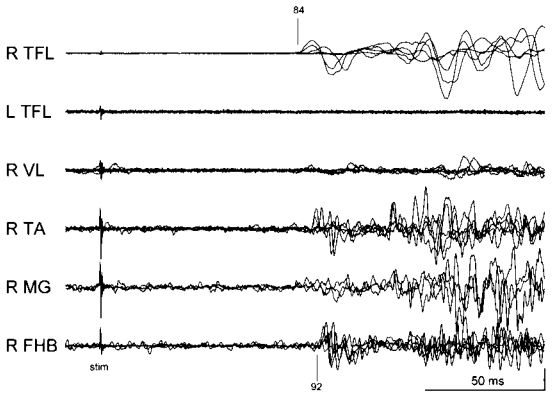

FIG. 2. Reflex responses to stimulation of the digital nerves of the left great toe, single trials superimposed. The pattern of electromyographic activity was similar to the spontaneous jerks, with a similar range of burst durations. After stimulation of the digital nerves of the right second toe at three times sensory threshold using ring electrodes, TFL was activated at 84 msec and FHB at 92 msec, the difference compatible with peripheral nerve conduction time. After stimulation of the tibial nerve at the ankle at twitch threshold, the responses were identical to those with stimulation of the toe. There was additional short latency activity in FHB at 47 msec, compatible with an H reflex (data not shown). No reflex responses were seen in the left TFL. Vertical calibration: 500 μV (R TFL, R FHB), 200μV (R MG), 100 μV (L TFL, R VL, R TA). Abbreviations: R, right; L, left; TFL, tensor fascia lata; VL, vastus lateralis; TA, tibialis anterior; MG, medial head of gastrocnemius; FHB, flexor hallucis brevis.

Response to Treatment

Treatment with baclofen 5 mg twice daily made little difference. Injection of botulinum toxin (Botox; total dose, 200 mouse units) into the right toe flexors, tensor fascia lata, and iliopsoas produced a marked improvement in mobility, foot posture, and the severity and frequency of the spasms. The response waned at 4 months, requiring further injections.

Discussion

Our patient presented with involuntary spontaneous and stimulus-sensitive shock-like jerks of the right leg, suggestive of myoclonus, superimposed on a more sustained abnormality of posture, suggestive of dystonia. Surface EMG recordings confirmed the presence of brief (50–100 msec) as well as sustained (up to 2,000 msec) co-contracting muscle bursts underlying these movements. These clinical and neurophysiological findings can best be described as myoclonus-dystonia.[6] MRI showed an area of gliosis in the contralateral posterolateral putamen associated with putaminal atrophy. We suggest that this lesion was responsible for the focal movement disorder.

The terms myoclonus–dystonia and myoclonic dystonia have been used in many clinical settings to describe the combination of shock-like jerks and prolonged abnormal postures. The term was first used in 1926 to describe cervical dystonia

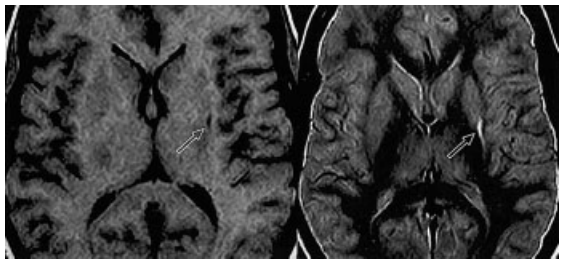

FIG. 3. Axial T1-weighted (**left**) and proton density (**right**) magnetic resonance images. The arrows mark the abnormal signal in the posterolateral left putamen, consistent with gliosis. The lesion is also high signal on T2 and FLAIR sequences. The putamen is smaller on the left than the right, especially the posterior portion of the nucleus. The internal capsule and globus pallidus are of normal signal intensity.

associated with tic-like hyperkinesias of the neck and face.[7] Later, it was used to describe a sporadic multifocal or generalised movement disorder that was presumed to be a variant of idiopathic torsion dystonia.[6] A familial form with autosomal dominant inheritance and marked sensitivity to alcohol has been reported.[8,9] More recently, it has been used to describe a focal movement disorder of the upper limb that can develop after lesions of the contralateral thalamus.[2,3] This is the first report of myoclonus-dystonia occurring in association with a lesion of the contralateral putamen.

Although dystonia is a well-described sequel to lesions of the putamen,[1,3,10] in previous reports, it has not been confined to the lower limb. Bhatia and Marsden[1] found reports of 11 patients with isolated unilateral lesions of the putamen, 8 of whom had contralateral dystonia. Of these, 2 had focal dystonia of the hand. Subsequently, a case of focal dystonia of the foot, later spreading to involve the hand, has been reported but the lesion also involved the globus pallidus, caudate nucleus, internal capsule, and insular cortex.[3] The presence of gliosis in the posterolateral putamen in our patient supports the somatotopic representation of the putamen that has been proposed in recent lesion analysis and functional imaging studies.[2,11]

In contrast to dystonia, myoclonic jerks have not been described previously secondary to focal putaminal pathology. There are rare reports of unilateral asterixis after putaminal lesions,[12–14] but this condition was excluded on clinical grounds and with surface EMG recordings. A focal form of the stiff person syndrome confined to a lower limb has been reported,[15,16] but the onset of our patient's movement disorder in infancy, contralateral putaminal lesion, and atypical neurophysiological findings[17] help exclude this possibility. Patients with longstanding spinal pathology may have flexor or extensor spasms, but the EMG bursts are typically prolonged (average burst duration of 14 seconds[18]). The shock-like nature of the jerks, absence of typical flexor posturing and absence of clinical or radiological evidence of spinal cord pathology also do not support this diagnosis. The focal nature of the myoclonus and stimulus sensitivity raise the possibility of cortical reflex myoclonus.[19] However, in contrast to typical cortical myoclonus, the cortical SEP after stimulation of the affected limb was of low amplitude (as can occur with pathological conditions of the basal ganglia[20]) rather than giant amplitude, and there was no evidence of a preceding cortical spike on jerk-locked back-averaging. We suggest that the focal stimulus-sensitive myoclonus was most likely secondary to disinhibition of the motor cortex arising from the putaminal pathologic state. A similar mechanism has been proposed to account for the myoclonus observed in corticobasal degeneration, which is also associated with poorly formed cortical SEPs.[21] Disinhibition of motor cortex has also been postulated as the mechanism of myoclonus that occurs in association with cerebellar[22] and thalamic lesions.[23] The sum of the latencies of the motor and sensory evoked potentials was 78 msec, compared to 92 msec for the reflex myoclonus in FHB, allowing 14 msec for a putative cortical relay.[24] In conclusion, the findings in our patient suggest that the range of movement disorders resulting from unilateral lesions of the putamen should be expanded to include focal myoclonus-dystonia.

Legends to the Video

Segment 1. Spontaneous and stimulus-sensitive jerks and dystonic posturing in the right leg present at rest, when standing, and while walking. The reflex jerks, consisting of co-contraction of antagonistic muscles with little displacement of the limb, are seen best in tensor fascia lata.

Segment 2. Improvement in gait and posture after injections with botulinum toxin. This segment was recorded 4 months after treatment as the effect was waning.

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Alcohol-Induced Paroxysmal Nonkinesogenic Dyskinesia After Pallidal Hypoxic Insult

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Abstract: We describe the first case of paroxysmal nonkinesogenic dyskinesia secondary to pallidal ischaemia, which is uniquely and specifically triggered by alcohol.

Key words: PKND; alcohol-triggered; pallidal hypoxia

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The paroxysmal dyskinesias are rare episodic movement disorders composing of brief and recurrent hyperkinetic attacks of chorea, dystonia, and ballism.[1] The terms paroxysmal dystonic choreoathetosis (PDC) and paroxysmal nonkinesogenic dyskinesia (PNKD) describe two related conditions for which attacks are not induced by sudden movements. Some cases are idiopathic, whereas others occur secondary to cerebral insult, usually to the basal ganglia. Idiopathic cases may be further subdivided into familial and sporadic forms.[2] Whilst various precipitants have been described in association with both idiopathic and secondary PNKD, to date alcohol is only known to trigger idiopathic PNKD attacks. We describe a case of PNKD secondary to hypoxic brain injury where episodes are only brought on by moderate alcohol consumption and are never spontaneous.

Case History

A 26-year-old, right-handed man presented with a 3-month history of episodic attacks of involuntary movements precipitated by drinking six to eight units of alcohol. Not every bout of drinking would result in these movements, but the attacks would never occur without this precipitant. In the 4 to 5 years before their onset, he had suffered several heroin overdoses, two of which were associated with apneic episodes of a duration liable to result in hypoxic brain injury.

The attacks occurred whilst still drinking, initially involving the right upper limb with dystonic flexing of the ring and little fingers at the metacarpophalangeal joints and supination of the forearm. After a few moments, the involuntary movements would spread to involve a gentle or vigorous dystonic flexing–extending tremor at the right elbow. Sometimes he would also develop similar movements at the left elbow and a tremulous dystonic posturing of the right or left ankle. The episode would last for up to 2 hours, subsiding gradually. There was no alteration of consciousness nor sphincter nor sensory disturbance. Attacks would occur up to two to three times a week. There were no neurological abnormalities on examination between attacks other than a fine jerky dystonic tremor of the fingers of the right hand and flexion of the right elbow.

At the time of presentation, he was drinking 20 to 28 units of alcohol a week, although in the past, this consumption had been up to 40 units. He had also abused LSD and ecstasy over the previous 10 years and recently ceased taking heroin and cocaine shortly before the onset of the abnormal movements. He smoked 30 to 40 cigarettes per day and cannabis. There was no family history of note.

Blood investigations, including copper studies and film examination for acanthocytes, were negative. Magnetic resonance imaging of the cervical cord was normal, but the brain revealed high signal in the globus pallidus bilaterally that was considered to be consistent with hypoxic damage (Fig. 1).

Discussion

The description of the attacks is consistent with paroxysmal nonkinesogenic dyskinesia[2] or paroxysmal dystonic choreoathetosis,[2] and the association with alcohol is unique and specific in a secondary or acquired case. Alcohol is well-recognised as a precipitant in familial cases.[3] However, because of the clearly defined onset of attacks after apneic episodes and the resultant pallidal abnormalities on imaging, it seems unlikely that the present case is idiopathic, be it familial or sporadic. In Demirkirin and Jankovic's review,[2] 2 of 17 cases of secondary PNKD were due to ischaemia

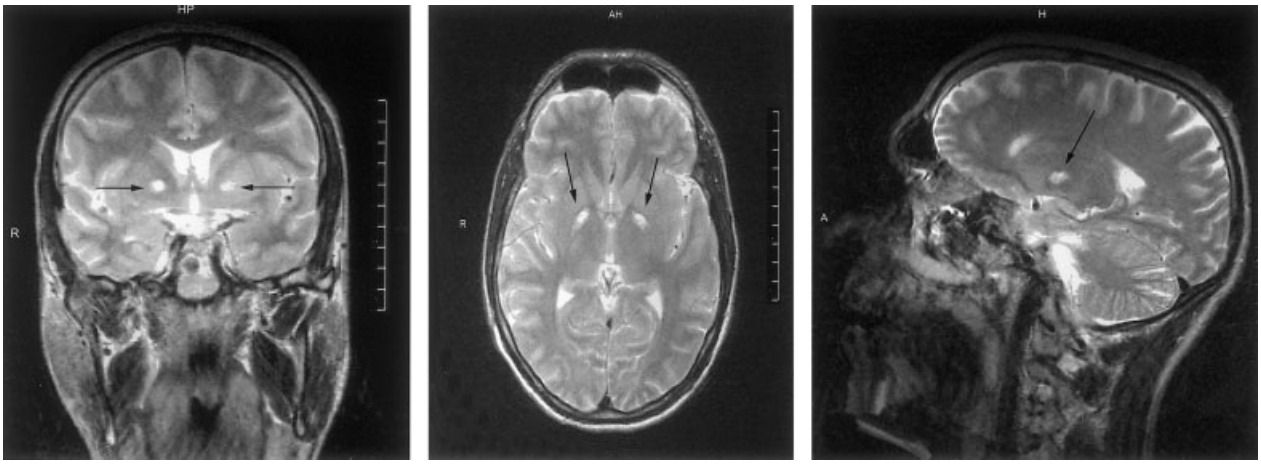

FIG. 1. Magnetic resonance imaging scans showing bilateral pallidal signal change (arrows).

as in the present case. However, although stress, fatigue, menses, and heat were listed as precipitants in 6 secondary (and 4 idiopathic) cases, alcohol did not trigger attacks. The only previously described nonfamilial cases for which alcohol is a precipitant are those where the underlying cause is neuroleptic use.[4] It has been proposed that alcohol, in this situation, acts by increasing synthesis and turnover of monoamines, including dopamine, which leads to acute dopamine depletion.[5] Presumably the dopaminergic block induced by the neuroleptics sensitises the patient to a state of incipient dyskinesia that is precipitated by the additional action of the alcohol.

It is proposed that alcohol may be acting similarly in the present case, in which sensitisation has occurred not by neuroleptics but by structural basal ganglia damage consequent upon anoxic insult. Indeed, the mild dystonic tremor of the fingers of the right hand between attacks may indicate an incipient dyskinetic state and mild underlying movement disorder. The concept of a chemical precipitant bringing out an underlying structural pathology has already been described in relation to movement disorders. For example, oral oestrogen-containing contraceptives may produce chorea in patients with previous Sydenham's chorea, chorea gravidarum, chorea associated with Henoch Schönlein purpura or who otherwise are found to have long-standing striatal abnormalities on imaging.[6] The neuroleptic sensitivity of dementia with Lewy bodies is also well-known.

The nature of movement disorder in this case also merits discussion, not just the precipitant. Pallidal lesions like those seen on the MRI of this patient most commonly will result in a (fixed) akinetic–rigid syndrome, whereas dystonic-type dyskinesia is more common after a putaminal lesion.[7] Although the particular site of pallidal damage may be important, the patient's age might be another consideration. A younger age at the time of basal ganglia insult seems to bias more toward a dystonic presentation, an old age toward an akinetic–rigid manifestation.[8] This pattern of akinetic rigidity in relation to later age of onset of a condition is of course reversed in the juvenile onset Westphal variant of Huntington's disease and the importance of the age of onset in other forms of dystonia has been recognised.[9]

In summary, we describe a case of PNKD that is secondary to a structural lesion and whose attacks are specifically precipitated by alcohol consumption. Although alcohol might theoretically alter dopaminergic balance in already damaged and consequently sensitised basal ganglia, the specificity of the precipitant remains unexplained. In a field where many aspects of pathophysiology are unclear, such as the link between the site of the lesion and the nature of clinical manifestation, and the influence of age upon this manifestation, further exploration of different specific precipitants of PNKD might provide valuable insight into the nature of the generation of movement disorders.

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High-Dose Piracetam Is Effective on Cerebellar Ataxia in a Patient with Cerebellar Cortical Atrophy

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Abstract: We describe a patient with cerebellar ataxia of degenerative nature who was administered high-dose piracetam in a single-blind trial. Piracetam was demonstrated to be highly effective on tandem gait and gait ataxia in daily doses of 60 g. We suggest piracetam has a potential anti-ataxic effect in human cerebellar ataxia when used in considerably higher doses than those indicated for other purposes. © 2003 Movement Disorder Society

Key words: piracetam; cerebellar ataxia; tandem gait; treatment of ataxia

There is no accepted pharmacological treatment of cerebellar ataxias of degenerative nature. To date, buspirone[1–6] and amantadine hydrochloride[7–9] have been used in several clinical trials with variable effects on ataxia.

Piracetam (2-oxo-1-pyrrolidine-acetamide) is a low molecular weight derivative of γ-aminobutyric acid (GABA) and has been widely used for the treatment of cognitive disorders in many European countries as a nootropic agent.[10–13] In 1978, Terwinghe and coworkers reported dramatic improvement of postanoxic myoclonus in a patient treated with piracetam.[14] Since then, the drug has been effectively used in myoclonus of cortical origin as well as in postanoxic myoclonus.[15–17] Furthermore, it has been demonstrated that piracetam has antiaggregant and rheological properties.[18] Ikeda and colleagues reported a significant beneficial effect of piracetam on myoclonus of cortical origin and to a lesser degree on gait ataxia. The authors attributed this improvement of gait ataxia to the reduction of myoclonus.[19] Based on their aforementioned experiences, we have tried this agent in adult patients with cerebellar ataxia of degenerative nature during the past 4 years. The initial results of our open-label clinical trial with moderate doses (30–45 g/day) of piracetam demonstrated mild benefit of short duration; consequently, we increased the doses to 60 g daily and noted substantial improvement of longer duration. It is well tolerated with occasional and reversible slight elevation in blood levels of creatinine. In this preliminary report, we describe a patient with cerebellar ataxia due to cerebellar degeneration whose ataxia, as shown on videotape recordings, improved moderately with single-blind administration of high-dose piracetam.

Case Report

A 22-year-old woman from Albania was evaluated at our department because of disequilibrium, head tremor, and mild difficulty in speech. She was healthy until 14 years of age, when she gradually developed clumsiness in the right upper limb, which led to difficulty in handwriting. She experienced unsteadiness in walking, which caused disequilibrium and occasional falls associated with head and trunk tremor a few years later. Her clinical picture exhibited a slow progressive course. Her history was unremarkable. Her family history was negative for ataxia, and there was no consanguinity.

Neurological examination revealed titubation of the head and trunk, mild cerebellar dysarthria, bilateral slowness of saccadic eye movements. Dysmetria, hypermetria, and dysdiadochokinesia were present in four extremities with mild left predominance. All limbs were hypotonic. Her gait was staggering with deviations from the walking direction. She was unable to tandem-walk more than three steps. She could stand with feet together, but she was reasonably comfortable with widened stance. Romberg test was negative. Deep tendon reflexes were symmetrically diminished. Plantar responses were flexors. Her cognition and neurological examination were otherwise normal. She had Raynaud phenomenon and livedo reticularis in the lower limbs. There was no clinical evidence of myoclonus.

Laboratory findings, including hemogram, sedimentation rate (6 mm/hr), and levels for serum glucose, urea, creatinine, GGT, ALT, γ-GT, CPK, LDH, total bilirubin, total protein, albumin, cholesterol, triglyceride, HDL, LDL, VLDL, serum electrolytes, iron, iron-binding capacity, ferritin, and vitamin E, were all unremarkable. MRI of the brain showed marked atrophy of cerebellar hemispheres without any pontine involvement (Fig. 1). Nerve conduction velocities and needle electromyographic examinations were within normal limits without

A videotape accompanies this article.

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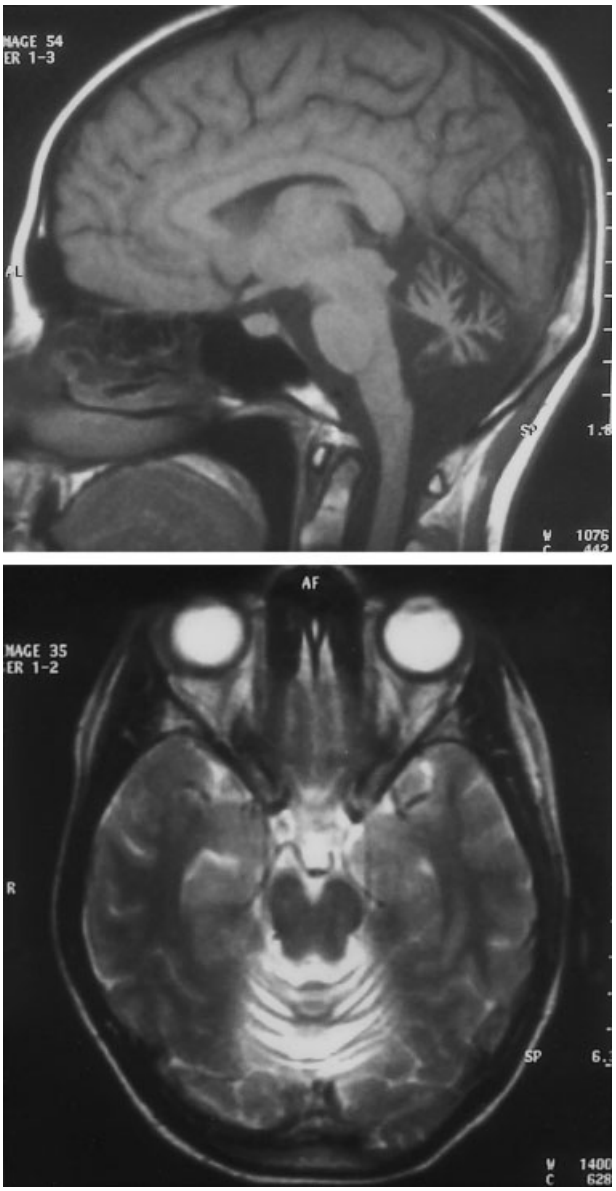

FIG. 1. Magnetic resonance imaging scan of the brain. **A:** A sagittal T1-weighted image demonstrates marked atrophy of the vermis and cerebellar hemispheres without any pontine involvement. **B:** An axial T2-weighted image confirms atrophy of the vermis and cerebellar hemispheres.

evidence of polyneuropathy or myoclonus. Electrocardiography and chest X-ray were normal.

After giving written informed consent, the patient was enrolled in the study. She was administered IV 50 cc of 0.9% saline solution in 100 cc of 5% dextrose solutions as placebo three times a day for 1 week. Then IV 30 g/day piracetam in 100 cc of 5% dextrose solution in three divided doses for 3 days, which was increased to 45 g/day for another 3 days and to 60 g/day for 8 days.

During a placebo baseline assessment, she could tandem walk up to 6 steps (see Videotape, Segment 1). Beginning on the second day of piracetam given 60 g/day, she was able to consecutively walk tandemly for 24 steps twice (see Videotape, Segment 2). She could stand comfortably with feet together. She experienced no side effects, and there were no abnormalities of routine blood tests, including the levels of creatinine performed every other day. The titubation, dysarthria, and dysmetria remained the same after treatment. She was recommended to take oral piracetam 7.2 g daily (three times a day in divided doses), and to maintain the therapy as 15-day parenteral cures, once every 2 months. Based on the information from a phone call, we learned she could not get the medication in Albania, and the beneficial effects of piracetam lasted only approximately 1 month after stopping the 60 g/day regimen. Eventually her clinical picture regressed gradually to the baseline state.

Discussion

In this patient with MRI-proven cerebellar atrophy, piracetam was demonstrated to be considerably effective on tandem gait and gait ataxia with daily doses of 60 g. Although the drug was well tolerated in high doses, it did not have any positive effect on head titubation, dysmetria, dysarthria, and slow saccades.

Ikeda and coworkers reported a significant beneficial effect of piracetam at a maximum dose of 24 g a day on the myoclonus of cortical origin. Furthermore, the authors observed improvement of gait ataxia ($P < 0.0001$) in some of their 60 patients with several etiologies that the authors attributed to the disappearance of myoclonus.[19] To our knowledge, the beneficial effect of piracetam on ataxia without myoclonus was not previously reported. According to our observations in this patient as well as in previous ones, the effect of piracetam on ataxia was rapid and the positive effect lasted approximately 1 month after discontinuation of the drug. Previous studies failed to show that piracetam could modify brain levels of several neurotransmitters.[20,21] The requirement of the high doses of piracetam for gait ataxia may be attributed to the presence of a possible metabolite of the drug being the active compound.

Several authors proposed that serotonergic system among other neurotransmitters in the cerebellum might be affected in cerebellar ataxia of degenerative nature.[1–3] Recent studies investigating the use of specific hydroxytryptamine1A (5-HT1A) agonist like buspirone in the treatment of ataxia has showed positive results. In a double-blind randomly assigned study of buspirone versus placebo, buspirone significantly improved cerebellar ataxia in 10 patients with cerebellar cortical atro-

phy.[1,3] Similarly, improvements in varying degrees with buspirone therapy in patients with cerebellar ataxia of several etiologies have been reported.[2,4–6] On the other hand, L-5-hydroxytryptophan, a serotonin precursor, has been tested on various types of ataxia without benefit.[22]

It was reported that, in addition to serotonergic drugs, amantadine hydrochloride has reduced some of the functional disabilities, including truncal instability in 16 patients with Friedreich's ataxia (FA)[8]; contrary to this finding, no significant effect of amantadine in FA was reported in a double-blind cross-over trial.[9] In another double-blind study with amantadine, among 27 patients with FA and 30 with olivopontocerebellar atrophy (OPCA), only the 30 with OPCA exhibited significant improvement in limb ataxia.[7]

In conclusion, on the basis of our clinical observations, we suggest that piracetam has a potential antiataxic effect in human cerebellar ataxia when used in considerably higher doses than those indicated for other purposes. It could be expected that piracetam might provide better or even the most beneficial effect on ataxia in much higher doses than we used. To investigate the effectiveness of piracetam on cerebellar ataxias of various origins, it is clear that double-blind studies are warranted.

Legends to the Video

Segment 1. Placebo period: The patient had titubation of the head and trunk, mild cerebellar dysarthria, slowness of saccadic eye movements, dysmetria, hypermetria, and dysdiadochokinesia in four extremities with mild left predominance. Her gait was ataxic. She could tandem walk up to 6 steps.

Segment 2. Piracetam period: The patient still has a shaking head and unsteady hands, but her walking was much improved. She was able to consecutively walk tandemly for 24 steps twice.

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