Response of CSF IgG to steroids in an 18-month-old with chronic inflammatory polyradiculoneuropathy

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■ During recovery from a upper respiratory infection, an acquired chronic inflammatory demyelinating polyradiculoneuropathy (CIDP) developed in a previously healthy 18-month-old girl. The CIDP followed a monophasic course and left her severely quadriparetic. One year after her neurologic deficit had stabilized, the cerebrospinal fluid (CSF) IgG synthesis rate was markedly elevated, and oligoclonal bands were identified in her CSF, suggesting ongoing inflammation. Her electromyogram (EMG) and nerve biopsy were consistent with a severe acquired segmental demyelinating polyradiculoneuropathy. A course of corticosteroid therapy resulted in dramatic, sustained, clinical and electromyographic improvement, normalization of CSF IgG synthesis rate, and disappearance of the oligoclonal bands. We are not aware of any previous reports that correlate serial measurements of CSF IgG synthesis rate and oligoclonal bands with clinical and electromyographic responses to corticosteroids in a child with acquired CIDP. We suggest that these CSF parameters are potentially useful in demonstrating active inflammation in cases of acquired CIDP even after clinical stabilization of neurologic deficits, predicting response to therapy, and monitoring resolution of the pathologic process.

□INDEX TERMS: IMMUNOELECTROPHORESIS; IMMUNOGLOBULINS, GAMMA CHAIN; POLYRADICULONEURITIS □CLEVE CLIN J MED 1989; 56:539–541

ACQUIRED chronic inflammatory demyelinating polyradiculoneuropathy (CIDP) in children under the age of five is uncommon. Cases of acute Guillain-Barré syndrome have been reported in infants,[1] but the natural history of nonrelapsing CIDP in childhood is unknown. Conflicting responses to corticosteroid therapy in CIDP have been noted. The variability in case reports, lack of controlled studies, and the oftentimes confusing terminology surrounding the acute-onset demyelinating polyradiculoneuropathies further complicate the study of treatment results.[2–4]

We report a case of acquired nonrelapsing CIDP in an 18-month-old girl that followed a mild febrile illness. She was left in a clinically stable, but severely impaired, neurologic state. Over the subsequent 12 months there was neither clinical improvement nor progression. One year after her neurologic deficits had stabilized, a course of corticosteroid therapy resulted in dramatic clinical and electromyographic improvement. Normalization of CSF IgG synthesis rate and clearing of oligoclonal bands correlated with these improvements.

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TABLE 1
CSF RESULTS

	WBC (/μL)	RBC (/μL)	Total Protein (mg/dL)	IgG/ albumin ratio	CSF IgG synthesis rate (mg/day)	Oligoclonal bands
Initial	2	0	108	0.1	24.7	+
5 months of daily steroids	0	0	71	0.17	11.91	–
4 months of alternate-day steroids	2	0	42	0.1	3.38	–

TABLE 2
ELECTROMYOGRAPHIC RESULTS

	Amplitude		Distal latency		Conduction velocity	
	7/10/85	3/27/86	7/10/85	3/27/86	7/10/85	3/27/86
Sensory responses						
Sural	NR	NR (>6μV)	–	–	–	–
Median (index)	NR	14 mV (>13 μV)	–	3.3 ms (<3.1 ms)	–	26 m/sec (>48 m/sec)
Ulnar	NR	14 mV (>8 μV)	–	3.2 ms (<2.3 ms)	–	–
Motor responses						
Peroneal	NR	1.6 mV (>1 mV)	–	6.5 ms (>4.6 ms)	–	18 m/sec (>42 m/sec)
Posterior tibial	NR	2.8 mV (>4 mV)	–	4.2 ms (>3.2 ms)	–	16 m/sec (>42 m/sec)
Median	0.9 mV	7.0 mV (>3.2 mV)	4.2 ms	3.0 ms (>3.6 ms)	13 m/sec	17 m/sec (>38 m/sec)
Ulnar	0.8 mV	6.0 mV (>2.8 mV)	8.6 ms	3.0 ms (>2.6 ms)	6 m/sec	16 m/sec (>45 m/sec)

NR = no response

CASE SUMMARY

While still recovering from an upper respiratory tract infection, a previously healthy 18-month-old girl developed an acute onset of upper extremity weakness that rapidly progressed to her lower extremities. Neurologic examination showed profound generalized weakness and areflexia. Cerebrospinal fluid (CSF) analysis showed 1 WBC/μL, blood glucose of 58 mg/dL, and protein of 92 mg/dL. There was no family history of neuromuscular disorders. Both parents were examined and had no clinical evidence of neuropathy. Guillain-Barré syndrome was diagnosed.

Her course was monophasic, and her condition remained unchanged over the next year. When we evaluated her at age 2 1/2, she was able to flex her elbows partially and grasp weakly with her hands. She was nonambulatory and capable of only minimal flexion of the knees and ankles. She was areflexic. Her general medical and neurologic examinations were otherwise normal.

The following laboratory test results were normal: SMA-16, Westergren sedimentation rate, serum protein electrophoresis, and lysosomal enzymes. A CT scan of the head and an MR image of the head were normal. Initial CSF studies included a WBC of 2/μL, a protein level of 108 mg/dL, and IgG synthesis rate of 24.7 mg/day (normal 0 to 3.1 mg/day), as calculated by Tourtellotte's formula.[5] Isoelectric focusing of the protein revealed the presence of oligoclonal bands (*Table 1*). An electromyogram (EMG) showed absence of sural nerve responses, absent or low-amplitude motor responses, markedly slowed conduction velocities, and segmental conduction blocks (*Table 2*). A sural nerve biopsy demonstrated marked loss of large myelinated axons with accompanying endoneural fibrosis. One-micrometer plastic-embedded sections of nerve demonstrated marked loss of large myelinated axons as well as thinning of the myelin sheaths of the remaining axons.

The patient began a course of daily prednisone (2 mg/kg/day). Within five months she could lift her arms above her head, generate resistance, and hold a fork, glass, and spoon. She was ambulating with a walker and able to change unaided from the supine to the sitting position. She remained areflexic. Repeat CSF analysis at age 23 months demonstrated improvement (*Table 1*). After an additional four months of alternate-day prednisone, she was ambulating independently and able to climb stairs. She could squat and stand without support

but continued to be areflexic. Repeat CSF analysis (*Table 1*) and electromyography (*Table 2*) were performed at age 27 months, and both demonstrated improvement.

The prednisone dosage was tapered and discontinued over an additional six-week period, and the patient was re-examined four months later (one year after initial evaluation). Reflexes were present in all extremities, except for the left lower extremity. The remainder of her examination was normal except for minimal finger weakness and difficulty with fine-motor coordination.

DISCUSSION

An elevated CSF IgG synthesis rate and the presence of oligoclonal bands are now accepted indicators of central nervous system inflammation.[5-6] We believe it is reasonable to assume that ongoing inflammation/demyelination, as demonstrated by our patient's CSF studies, was responsible for her lack of clinical improvement.

Recovery in our patient would not have been anticipated by clinical and electromyographic criteria. Prior reports indicate that full recovery from an acute polyradiculoneuropathy is unlikely if improvement does not begin within the first several weeks after maximum weakness develops.[7] Our patient demonstrated no improvement one year after the onset of her illness. Her EMGs would lead to a similar conclusion.[8] Nevertheless, after corticosteroid therapy was started, there was dramatic clinical and electromyographic improvement. Normalization of CSF IgG synthesis rate and disappearance of the oligoclonal bands correlated with these improvements. Although the pathophysiologic mechanism of the ongoing inflammation/demyelination and elevated CSF IgG synthesis rate remains speculative (immunologic, inflammatory, infectious, allergic), it appears likely that steroid therapy altered this process and allowed clinical improvement.

We conclude that active inflammation/demyelination continues in some cases of acquired chronic inflammatory polyradiculoneuropathy well after clinical stabilization of neurologic deficits. Evaluation of CSF for IgG synthesis rate and the presence of oligoclonal bands should be performed in cases of acquired CIDP to demonstrate the presence or absence of ongoing inflammation/demyelination, predict potential clinical response to steroid therapy, and guide duration of treatment.

Furthermore, we suggest that in the event of clinical relapse, investigating CSF for IgG synthesis rate and oligoclonal bands could be useful in monitoring response to treatment. Whether these parameters can provide further insight into the pathogenesis of this disease remains open to further investigation.

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