BENIGN VI NERVE PALSY IN CHILDREN

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The development of a cranial nerve palsy in a child is an ominous event which usually indicates the presence of tumor, hydrocephalus, or meningitis. Exceptions to such serious diseases are welcomed by the clinician who wishes to defer diagnostic studies and give a good prognosis. The benign cranial nerve palsy syndrome, which is emphasized here, has the following features. A painless VI nerve palsy which clears without residua may develop in children of any age 7 to 21 days after a non-specific febrile or upper respiratory illness.

The cases reported here were obtained from the diagnostic index of the Medical Records Department of the Johns Hopkins Hospital (years 1952–1964) and the personal records of the authors. The following case summaries are condensations of usually long and elaborate hospitalizations in which considerable deliberation was given to the likelihood of serious disease. Negative information and findings were not included here unless they were felt to be directly pertinent to the main theme of this study.

CASE REPORTS

J.H.

A 3-year-old boy had had repeated head colds and an otitis media in November 1954. The ear infection cleared but in January 1955 he and his whole family had a febrile illness associated with vomiting. In February of the same year the patient developed a left VI nerve palsy and was admitted to the hospital on February 5, 1955. The tonsils and adenoids were found to be enlarged. Lumbar puncture and skull x-rays were negative. The peripheral blood was normal at first, but on March 7 a smear revealed a 6% lymphocytosis. Thereafter, the patient had a steady improvement in the

VI nerve palsy, so that by October 1955 recovery was complete.

A.L.

A 13-year-old boy with a history of migrainous headaches had a febrile illness (temperature 102°F) with vomiting for 8 days in June 1955. He did not complain of diplopia when admitted to the hospital, but the right eye was observed to abduct only 30°. Vision was normal, and diffuse lymphadenopathy was the only other physical sign. Lumbar puncture was normal and the erythrocyte sedimentation rate was 50 mm/hour at first and later dropped to 34 mm/hour. X-rays suggested clouding of the right petrous apex and antrum but were not diagnostic of sinusitis. After 6 days, the patient left the hospital afebrile and did not return for out-patient visits. Nine years later the mother was unaware that anything had been wrong with the movements of his right eye.

E.J.

A 6-year-old boy was first seen February 15, 1955, with a history of a head cold 2 weeks before and sagging of the right face for 3 days. Examination revealed a peripheral right facial weakness, limitation of conjugate gaze to the left, and nystagmus on gaze to the left. He was afebrile; the white blood count was 9,700 with 54% lymphocytosis. Lumbar puncture was negative. Improvement began during his one month of hospitalization.

Comment: The left conjugate gaze palsy and right peripheral facial palsy would suggest that two lesions within the brain stem were responsible. Semantic and physiologic difficulties exist in classifying patients who have a gaze palsy to one side. Nuclear involvement of the VI nerve is entirely possible in such cases.

S.H.

An 18-month-old boy was admitted to the hospital April 22, 1960, with a history of frequent

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colds—the last being 2 weeks before, with fever and purulent conjunctivitis. Seven days before admission, “both eyes crossed inwardly.” Examination revealed thickened tympanic membranes, lymphoid tissue in the pharynx, and a right VI nerve paralysis. Skull x-rays were negative; the white blood count was 13,000 with 6 juveniles, 38 polys, 6 eosinophils, and 47 lymphocytes per 100 cells. Lumbar puncture was not performed. Within 1 month improvement was noted, and 3 months later the VI nerve palsy had cleared completely.

L.G.

A 2-year-old girl was first seen February 2, 1960, with a history of a head cold 3 weeks before and a turning in of the right eye for one week. Examination revealed a right VI nerve palsy. All laboratory studies were negative. Complete recovery had occurred 6 weeks later.

C.M.

A 4-year-old girl was admitted to the hospital on February 27, 1960, for evaluation of a left VI nerve palsy and mild proptosis of the left eye. She apparently had had a slightly puffy left eye all her life—which was later found to be on the basis of a hemangioma. Four weeks before her admission, she and her sisters had had “flu” with red throats. One week before admission, she developed a runny nose and cough, then a left sided headache. She complained of diplopia 2 days before admission. The mother noted that the left eye did not move laterally. Examination revealed a left VI nerve palsy, slight proptosis, and a small hemangioma under the left upper lid. After admission the child developed a fever and vomited intermittently.

Laboratory studies revealed a white blood count which ranged from 9,000 to 18,000 with a lymphocytosis of 58% on two occasions. At first the spinal fluid contained 328 monocytes, but later it cleared completely. The course in the hospital was quite unusual, with the child developing more proptosis and a generalized limitation of movement. The left pupil was also enlarged. Five weeks after admission, abduction began to improve and was followed by increased movement in other directions. She was considered to have had a cavernous sinus thrombosis. The mechanism was not defined but did not seem to be a septic process.

Five years later she had transient bulging and slight limitation of movement of the left eye which cleared after several months.

Seven years after her first admission, the child returned because of progressive proptosis on the left with some limitation of movement. Vision was reduced to 20/30. Arteriography revealed a posterior orbital mass encircled by vessels. The repeated episodes were suggestive of either hemangioma or dermoid. A 1.5 X 1.5 cm hemangioma was removed by extra dural transfrontal craniotomy.

Comment: This case is included because it was so unusual in symptomatology, findings, and course. Hemorrhage or thrombosis of hemangioma are recognized mechanisms by which these tumors produce symptoms. The transient spinal fluid monocytois is difficult to explain and may well reflect an infectious cause of thrombosis of the hemangioma when it was smaller. In the original versions of this report this patient was thought to be an atypical variant of the “benign” VI palsy syndrome. Rewriting and editorial review caused delay, and the patient, who had been followed closely, was re-studied and operated on.

V.S.

A 3-year-old boy was first seen with a right VI nerve palsy without preceding respiratory infection. The tonsils and adenoids were not enlarged, and all laboratory studies, including skull x-rays, were negative. The palsy cleared in 3 months with no residual abnormalities.

C.B.

A 22-month-old boy was first seen in June 1961 with a history of several episodes of falling on his face in the previous 4 months. He had had a mild upper respiratory infection 2 weeks before and the right eye had turned in to the nose during the 10 days before admission. Examination revealed that the right eye had partial limitation of abduction. The white blood count was 6,800 with 68% lymphocytes and 27% segmented neutrophils. Two months later the right eye moved entirely normally.

M.W.

A 10-year-old girl had lymphadenopathy in January 1964. When she was first seen on November 4, 1964, she had had a recent bump on the head and there had been epistaxis and diplopia for 2 days. The right VI nerve was paralyzed; she had supraclavicular and postauricular lymphadenopathy. Mild anemia was present, and the white blood count was 7,550 with 51% polys and 38% lymphocytes. X-rays showed poor aeration of the right mastoid bone. Lumbar puncture was negative. The VI nerve palsy improved in 6 weeks and was completely gone in 8 weeks.

R.J.

A 15-year-old boy was first seen December 1, 1964, complaining of several days of rhinorrhea,
right-sided headache, and epistaxis. The temperature was 102°F, and the white blood count was 17,750.

He was considered to have a viral illness until he returned December 12 complaining of horizontal diplopia, which was found to be due to a right VI nerve paralysis. He was admitted to the hospital where x-rays revealed clouding of the sphenoid sinus. There was anemia (Hct 27%), which was presumed to be secondary to the epistaxis. The clouding of the sphenoid sinus led to exploration of the ethmoid sinuses, which were normal. Pneumoencephalography and cerebral arteriography were negative. Six weeks after onset the palsy improved and by 10 weeks eye movement was completely normal.

**J.D.**

A 7-year-old boy was first seen January 25, 1964, with the history that 3 weeks before he had developed a fever, frontal headache, and shaking chills. A throat infection was diagnosed and treated with penicillin. One week before admission he developed a head turn to the right and crossing of his eyes. Examination revealed a right VI nerve paralysis and poor vision in the left eye from a juxtapapillary choroiditis. The ocular inflammation was evidenced by inflammatory cells in the aqueous and vitreous of the left eye only. Laboratory studies, including lumbar puncture, were negative except for an elevated erythrocyte sedimentation rate (32 mm/Hg), slightly raised level of serum globulins (3.4 mg/100 ml) and white blood count of 13,500. The patient was given penicillin, chloramphencol, and prednisone. The right VI improved before the choroiditis subsided. Good vision (20/30) was obtained in the left eye.

**T.S.**

A 10-year-old girl was seen first April 10, 1965, for evaluation of a partial right VI nerve palsy. During the previous winter she had had repeated episodes of tonsillitis and an otitis media which responded to antibiotics. Her tonsils and adenoids were removed on March 3, 1965. Following this she again developed right ear ache and pain around the right mastoid area. These pains disappeared, and 3 days later she suddenly developed horizontal diplopia. A neurosurgeon found a partial right VI nerve palsy. There was no fever or leucocytosis. Lumbar puncture was not performed.

Examination 5 weeks later was entirely negative, with no evidence of VI nerve palsy. X-rays revealed some sclerosis of the right mastoid and a suggestive clouding of the right petrous apex. The child continued to improve, and x-rays of the mastoid showed clearing 2 weeks later.

**COMMENT**

The ages of these children ranged from 18 months to 15 years; their sex was not an important factor. The time interval from recent febrile or respiratory illness to onset of the VI nerve palsy varied from 7 to 21 days. Two patients had no recent preceding illness. Six of the 12 patients had had fever. Three of the children developed palsy in early 1955, three in early 1960, and two in the autumn of 1964. Two of the children had recently had otitis media, and one had scarred ear drums; but none had pain in the eye or ear at the time of onset of the VI nerve palsy. The right VI nerve was involved in nine patients and the left in three. In E.J. there were features which suggested a left conjugate gaze weakness, rather than an isolated peripheral VI nerve palsy, this possibly being an early episode of multiple sclerosis. One patient later was found to have a hemangioma at the apex of the involved orbit. Papilledema was not seen in the cases reported here. Relative lymphocytosis (47, 54, 58, 61, and 65%) of peripheral blood was seen in five patients. Lumbar puncture was performed in 7 of the 12 patients, but only in C.M. was any abnormality demonstrated (a transient lymphocytic response). The VI nerve palsy began to improve within 3 to 6 weeks in all children but one (J.H.), and the palsy had cleared by 10 weeks in all but J.H., who required 9 months for final resolution.

This syndrome is not a new entity, and experienced clinicians recall cases in which the combination of only fever and VI nerve palsy cautioned them against other diagnostic measures. Sir Charles Symonds, in a discussion recorded in the proceedings of the Royal Society of Medicine, makes reference to his observations of patients in whom VI nerve palsy followed febrile illness and was of no consequence. In the same discussion he also mentions instances in which VI nerve palsy followed otitis media, and yet there was no pain and little constitutional disturbance. The palsy he considered to be the result of an aseptic
thrombosis of the inferior petrosal sinus, adjacent to the VI nerve as it passes through Dorello’s canal. This opinion follows his thinking and work on otitic hydrocephalus. Inferior petrosal sinus thrombophlebitis has been considered as the mechanism in Gradengo’s syndrome (otitis media, petrositis, VI nerve palsy, and pain on the affected side).2

Two possible etiologic mechanisms can be proposed to explain the combined clinical events described here. The first possibility is related to the disease processes in Gradengo’s syndrome as described previously. The second depends upon the fact that there are neuritic complications of viral illnesses.

Otitis media had been present in two patients and scarred ear drums were seen in another, suggesting that a painless Gradengo’s syndrome was possibly the responsible mechanism. The right abducens nerve involvement seen in these three patients, as well as six others in this series, may be significant. The right ear and VI nerve were involved in 58% of the 180 cases of Gradengo’s syndrome reviewed from the literature by Knauer in 1946.3 Greer recently described eleven children with benign intracranial hypertension. He found evidence of middle-ear disease in all; the right side was involved in nine and the left in two.4 Systemic virus infections can be followed by peripheral neuritis; as examples of this, convalescent VI nerve palsies were seen during the influenza epidemic of 1918.5 One case has been seen after Coxsackie B 5 meningitis.6 Two features of the present series suggest viral involvement in some of the cases. The small clustering of three cases each in early 1955 and 1960 and two in the autumn of 1964 may be explained on the basis of epidemic infections by virus with neurotropic predilection. Lymphocytosis of the peripheral blood seen in five patients can be considered a sign of recent viral infection. (J.H. and E.J., seen in early 1955, had lymphocytosis, as did S.H. and C.M. in early 1960.) No virus cultures or serologic studies had been done on these patients.

The VI nerve palsies described in this series of patients must have resulted from more than one etiologic mechanism. The long course of the VI nerve has always been given as a factor for its frequent involvement in a variety of pathologic processes, such as meningitis, tumor, hydrocephalus, and trauma. Its relation to Dorello’s canal and the inferior petrosal sinus provides a second vulnerability. Peripheral neuritis or demyelination after viral illness must also be considered.

This group of patients, who presented with a VI nerve palsy as their main symptom, were first suspected of harboring a severe disease process. Neurologic signs other than the VI palsy were seen in only two patients (E.J. and C.M.) who have been qualified previously. Differential diagnosis for more “malignant” causes of VI palsy should include subdural hematoma, hydrocephalus, suprasellar cysts and gliomas, pontine glioma, cerebellar tumors, medulloblastoma, and meningitis.

Subdural hematomas usually occur under age 2, with evidences of trauma, obtundation, retinal hemorrhages, and long tract signs. Hydrocephalus has usually made its presence known by enlargement of the head and papilledema. Suprasellar cysts, craniopharyngiomas or gliomas may be calcified and cause optic atrophy and secondary sexual aberrations before they enlarge sufficiently to cause a VI palsy. Glioma of the pons often presents as bilateral VI palsy. The key differential points are that these VI palsies are associated with paralysis of conjugate gaze in which the medial rectus of the opposite eye does not overshoot on attempted lateral gaze. Lateral gaze of the adducting eye can be accomplished by a convergence mechanism in which both eyes converge and pupils become miotic since accommodation is stimulated by the convergence mechanism. Cerebellar tumors usually cause ataxia and papilledema. Meningitis usually produces fe-
ver, nuchal rigidity, severe obtundation, and polymorphonuclear leucoeytosis; the exception is tuberculous meningitis which may be more indolent in onset and signs.

The benign syndrome emphasized in this report must not be seriously considered until the clinician has assured himself that there is no papilledema, abnormal skull x-ray, ataxia, enlarged head, or other neurologic sign, that the child is alert, and that the spinal fluid is negative.

SUMMARY

The case histories of 12 patients who developed a VI nerve palsy after an apparently benign illness have been presented. The palsy developed in children of any age in 7 to 21 days after fever or upper respiratory illness and cleared, in all but one child, within 10 weeks. Two etiologic mechanisms are possible: otitis media and its complications, or neuritis after systemic viral illness.

The most important conclusion is that this is a relatively benign entity which first presents with malignant implications. Recognition of this syndrome allows the clinician to cautiously defer complicated diagnostic studies, such as arteriogram and pneumoencephalogram, with the expectation of improvement in the VI nerve palsy.

REFERENCES