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THE IMPORTANCE IN CLINICAL DIAGNOSIS OF PARALYSIS OF ASSOCIATED MOVEMENTS OF THE EYEBALLS (BLICK-LAEHMUNG), ESPECIALLY OF UPWARD AND DOWNWARD ASSOCIATED MOVEMENTS.

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(*Concluded from page* 448.)

Case 3. Hemorrhage of right tegmentum of the pons.

F. D., aged forty-four years, stone mason, was admitted Feb. 8, 1902, to the service of Dr. Arthur V. Meigs in the Pennsylvania Hospital.

Family history is negative.

Previous history: He had been drinking much for a month before his symptoms developed. Yesterday (Feb. 7) was at work cutting stone and feeling well, when he had a stroke at 4 p.m. He fell to the ground but did not lose consciousness and had strength enough to crawl to a block of stone and sit down. His friends noticed his loss of power on the left side and peculiar inward squint of right eye, which, however, disappeared before he reached the hospital, but returned the following day. He had no real convulsions but shook all over after the stroke.

Present condition: He is a short, chunky Italian and cannot talk plainly, and has loss of power on the right side of the face. Pupils are equal and much contracted. Eyes are straight. Beads of sweat are on the left half of face, which retains the normal wrinkles, while the right side has lost all of these. The tongue can be but slightly protruded, and deviates slightly to the right, and is not tremulous. Respiration is good and even. Fremitus, percussion note, and breath sounds are normal both front and back.

Heart: Pulse is strong and full. Apex beat is not visible. Dulness extends from the left border of sternum to within 2 cm. of nipple line. There are no murmurs.

Liver: Dulness from 5th rib to costal margin in nipple line.

Spleen: 9th to 11th rib and is not palpable.

Abdomen fat and soft.

He has only partial power of the left upper and lower

limbs. Ankle clonus is not present. The left patellar reflex is increased, the right is normal. He has no pain and lies in comfort, inconvenienced only by loss of power.

Urine is acid, 1020, trace of albumin, no sugar, many hyaline and granular casts, uric acid crystals.

The patient was seen by me Feb. 17, 1903, at which time I dictated the following notes:

Left pupil is considerably larger than the right and the left eyeball protrudes a little more than the right, and the left palpebral fissure is a little wider than the right. Each pupil contracts promptly to light but soon dilates again. Contraction of the pupils is probably prompt in convergence. Accommodation reaction can not be tested. He cannot close the right eyelids. In looking upward the forehead is not wrinkled on the right side. In showing his teeth only the left corner of the mouth is drawn upward. He has therefore complete or almost complete paralysis in the entire distribution of the right 7th nerve. Cannot protrude the tongue beyond the lips, and it deviates slightly toward the right.

Masseter muscle contracts well on the left side, but much less strongly on the right side, and when the mouth is opened the jaw goes a little to the right. He has therefore weakness of the right masseter and right pterygoids. Apparently he has immobility of the eyeballs, as he is unable to look in any direction other than straight forward. His intelligence is feeble but is sufficient to enable him to understand simple questions.

When his face is stuck with a pin on either side he does not seem to have great pain. If anything, he gives more evidence of pain when he is stuck on the right side.

Voluntary power in the right upper limb is good, while the left is paretic but not completely paralyzed. While he can move the whole upper limb, he cannot raise it above his head or close the fingers firmly.

Tendon reflexes of each upper limb: Biceps and triceps tendon reflexes are not very distinct, and are not greater on the left side than on the right. He gives very little evidence of pain when either upper limb is stuck with a pin. He is weak in the left lower limb, but has still some movement in this limb. He can draw this limb up slightly at the hip and knee, and can move the toes. The movements of the right leg are much better than those of the left, but probably are not fully normal. The patellar reflex is diminished on each side, but is better on the right side. Ankle clonus is not present on either side. The Achilles jerk is diminished on each side. The Babinski reflex is not obtained on the left side, but the toes are neither flexed nor extended. On the right side the movement of the toes is distinctly flexion. Sensation of pain is probably preserved in each lower limb.

On attempting to converge the right eyeball moves down and inward, but the left eyeball moves only slightly downward.

Feb. 20. He has been quiet. Bowel movements have all been involuntary. Temperature has gone up somewhat and breathing is difficult. He has a tendency to let the tongue fall back and obstruct the ingress of air. Hands are twitching at times. Left pupil is larger than the right. Inward squint of right eye continues. Immobility in lateral direction continues.

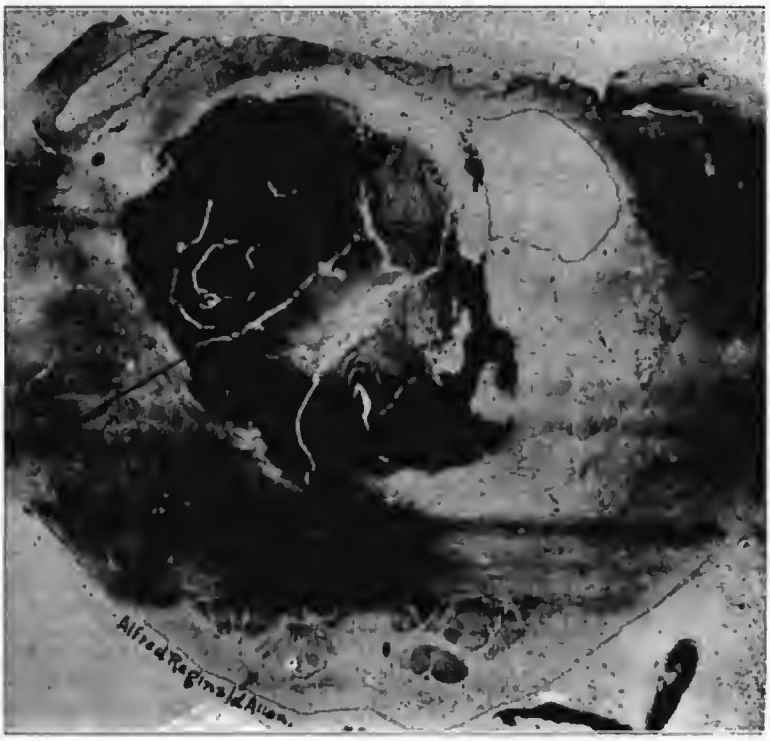

FIG. 9. Line shows hemorrhage of the right tegmentum of pons. Inward deviation of the right eyeball. Immobility of both eyeballs ten days after the apoplexy. Temporary paralysis of all associated movements. Convergence preserved, although weak.

Feb. 22. Condition while very alarming yesterday is now much improved. Breathing is easier, intelligence is better. He recognized and talked with his son.

Feb. 24. The eyes have regained a large amount of lateral movement [the direction not stated]. Hand grasp slightly

firmer, pulse moderately good. Temperature touched normal yesterday.

Feb. 26. Condition gradually getting worse, but no special change in nervous symptoms. He is weaker.

Temperature during first few days after admission was between 99 and 101 degrees, then dropped below normal for several days, but on Feb. 20 rose again and remained more or less elevated until death.

Feb. 28. Patient died at 1.30 a.m.

The clinical diagnosis I made in this case was hemorrhage of the right tegmentum of the pons, and it was confirmed by the necropsy.

Important in this case were the following symptoms developing after an apoplexy: Contraction of right pupil, almost complete paralysis in the entire distribution of the right facial nerve, paresis of the right side of the tongue, paresis of the right muscles of mastication, weakness of left upper and lower limbs, but not paralysis, inward deviation of the right eyeball, immobility of both eyeballs ten days after the apoplexy. There was therefore at least temporary paralysis of all associated movements. Convergence was preserved though probably was not normal. It is not probable that the paralysis of upward and downward associated movements would have been persistent if the patient had lived, although the paralysis of right lateral associated movement would probably have remained.

Case 4. This case has been reported by Dr. William Campbell Posey[19] when the disease was in an earlier stage.

The early notes are taken from Dr. Posey's paper.

"F. S., blacksmith, forty-eight years of age, came to the Wills Eye Hospital upon Sept. 22 of this year, on account of failing sight. He had been in attendance at the clinic a year previously on account of supraorbital headaches and general presbyopic symptoms, and had obtained a pair of glasses which gave him normal reading power in both eyes. The examination at that time showed normal fundi; the pupils were noted as being 3½ mm. in size, and the irides responded promptly to light, but sluggishly upon convergence. No note was made of any limitation in the extraocular motions or of any unusual position of the head.

"Corrected vision was normal in both eyes. The patient continued his trade until 3 months ago, when he was compelled to desist on account of attacks of vertigo. These attacks would come on suddenly, without premonitory signs, and were usually induced by change of posture. He had no headache,

[19] Annals of Ophthalmology, July 1, 1904.

neither nausea nor vomiting, and his body weight was well maintained. He was mentally depressed, however, most of the time. The patient denies specific infection, but acknowledges masturbation. During 25 years he drank very heavily, being practically in a continual state of intoxication the most of that time; for the past 5 years, however, he avers that he has

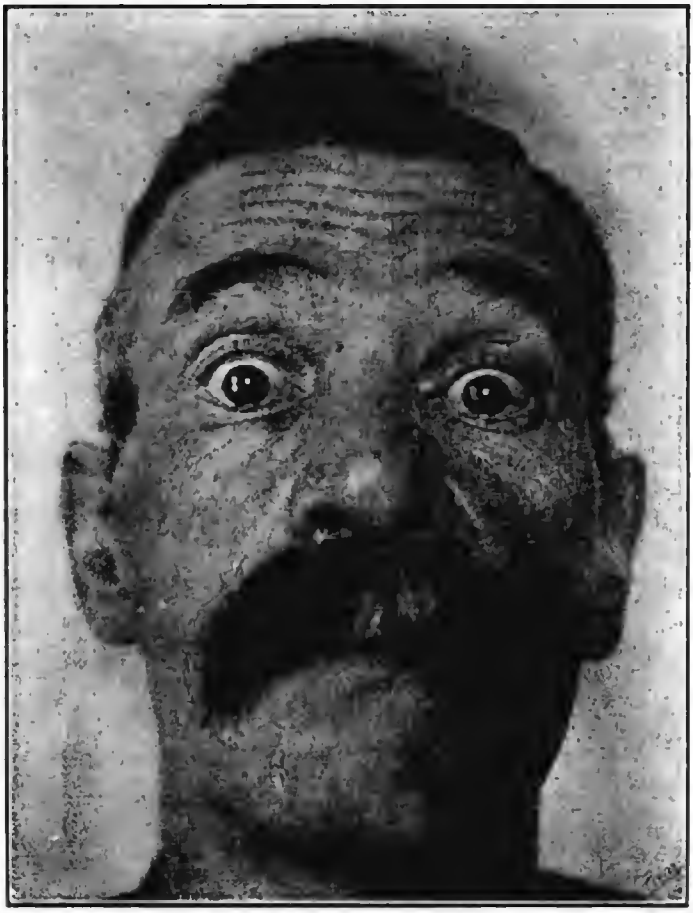

FIG. 10. Paralysis of upward movements of the eyes showing widening of the palpebral fissures and lagging behind of the eyeballs when patient endeavors to look up. (Photograph from Dr. Posey's paper.)

drunk nothing. He says that he never chewed, but that he has smoked about ½ package of tobacco a week since he was a boy. Although subject to slight rheumatic pain, he has never

had a severe attack of rheumatism or of any other systemic disease. He has never suffered a traumatism or a fall. His family history is negative.

"While sitting quietly upon the bench, waiting his turn to present himself for examination, the writer noted that the patient presented a peculiar fixity of gaze, which was found to be occasioned by the fact that the eyes were kept fixed in the primary position and that the patient moved them but little to right or left but sat with his gaze directed straight in front of him. The patient looked anxious and changed the expression of his face but rarely. Closer inspection revealed that the head was thrown slightly back and that several mm. of clear sclera intervened between the margin of the upper lids and the upper limbus of both corneas. When requested to fix the examining finger held in front of the eyes and in the median line, the head was thrown further back and, as the finger was carried upward this was more and more marked, while the eyes remained fixed, not rotating above the horizontal plane. The palpebral fissures grew wider as the patient endeavored to look up (see accompanying photograph) and as the eyes lagged behind, the impression was given of an inverted Graefe lid sign. Lateral motions to the right and left were normal, though the eyes followed the movements of the finger somewhat tardily. Downward motion, too, was conserved, though rotation in this direction was accomplished with an effort and only after several trials. Convergence was lost, the visual axes of both eyes remaining parallel when the finger was made to approach the eyes in the median line; the internal rectus muscle of each eye, however, functioned perfectly in the associated motion toward right and left and also in the unassociated movements inward. In contradistinction to this, however, there were no upward movements in either eye when each was tested singly. The pupils were 3 mm. and were prompt to light but somewhat sluggish to accommodation stimuli. The fundi were normal, the nerves being of good tint. Corrected vision equalled 5—5 in each eye. The visual fields were normal, save for a slight concentric contraction for form and color in each eye.

"When questioned further regarding the nature of the vertigo of which he particularly complained, it was elicited that he had never lost consciousness in the attacks, but that he is unable to stand, on account of extreme giddiness. He frequently has uncontrolable laughing fits at the time. There are no spasms during the attack, and though he falls he is able to rise again at once."

This patient was referred to me for examination by Dr. Posey, Sept. 23, 1903. My notes made at that time are as follows:

There is no contraction of the visual fields tested by the hand. The irides respond promptly to light, but slowly in accommodation. The speech is indistinct and bulbar in character, and he has had difficulty in swallowing during the past three months. The saliva dribbles from his mouth constantly. The tongue is tremulous and possibly a little atrophied on the right side. The fifth and seventh nerves are not involved. Lateral movements of the eyeballs are good. He seems to have some slight impairment of downward movement of the eyeballs, as well as complete paralysis of upward movement. Attempts to look either upward or downward cause dizziness. Sensations for touch and pain are normal in all parts of the body. He complains of bad vision. The breath is very offensive and indicative of mercury. Voluntary power is good in all the limbs. He sways slightly when standing erect with eyes open, and still more so when eyes are closed. The biceps and triceps tendon reflexes and wrist reflexes are probably a little prompter than normal. The patellar reflex is much exaggerated on each side, but the Achilles reflex is normal on each side, and there is no ankle clonus. There is no Babinski reflex, the toes on the left side are not distinctly moved while those on the right side are flexed. There are no urinary disturbances.

Dec. 19, 1903. He has been having severe occipital headache during the past week. The saliva still dribbles from the mouth. When rising from a chair he lost his balance and fell to the floor. He has fallen before this. He does not show hemiasynergy. He says he can hear perfectly.

I received the following note from Dr. W. Zentmayer concerning the patient: "An examination Dec. 28, 1904, showed that the position of rest of both eyes was about 20° below the horizontal plane. All attempted conjugate movements except to the right were lost, and that to the right was limited. When not commanded he at times moves the eyes slightly to the left. The right palpebral fissure is decidedly wider than the left. The pupils are normal. Convergence power is lost."

Through the courtesy of Dr. M. H. Fussell, Dr. Zentmayer, and Dr. P. N. Moylon, I had an opportunity to examine this patient again on Jan. 22, 1905, at which time I made the following notes:

He has no headache and no dizzy spells, but his statements are not reliable. He has not had nausea or vomiting, at least since Oct. 1, 1904. Mentality is affected. Understands what is said to him, but in replying repeats his words several times. His speech is indistinct and he mumbles much in talking, and has not much modulation of his voice. Frequently he utters a peculiar bellowing noise and has forced movements of face, although it is hard to say whether they are more like laughing

or crying. He is said to choke frequently in swallowing solids. Raises forehead well on each side and closes eyelids well, and draws up the lower part of each side of his face well. Masseter contracts well on each side, and there is no deviation of lower jaw on opening the mouth. Sensations for touch and pain are normal in the face. The tongue is protuded straight, is not atrophied, and shows no fibrillary tremors, and the movements are free. With finger in right ear he hears the voice when it is not very loud, and same is true when the right ear is tested; he is not deaf.

He is entirely unable to raise the eyeballs, but has slight conjugate lateral movement to the right and left, downward movements are much impaired. Hemianopsia is not present and the vision in upper and lower fields seems to be good.

If left eyelids are closed the right eyeball goes much further to the right, or if the right eyelids are closed the left eyeball goes to the right better than do the eyeballs when he tries to look to the right with both eyes at the same time. Movement of either eyeball separately, when one eye is closed, to the left is also much greater than when he tries to look to the left with both eyeballs at the same time. The associated lateral movements are therefore much more impaired than are the lateral movements of each eyeball separately. Ptosis is not present. Pupils are equal, and irides react promptly to light. Accommodation is not so distinct. Convergence is entirely lost. Movements of head are free. There is some tendency for the eyes to be directed downwards. Grasp of each hand is good. Movements of the upper extremity are good. Biceps and triceps tendon reflexes are exaggerated a little on each side. Sensations for pain and touch are normal in the upper limbs. Finger to nose test shows a little ataxia on each side. Sense of position is normal in each hand. Stereognostic perception is normal in each hand. Resistance to passive movements in the lowers limbs is normal. Voluntary power in the lower limbs is normal at all parts.

Patellar reflex is a little exaggerated on each side. Ankle clonus is not obtained on either side. Babinski's reflex is uncertain because the patient holds the foot very firmly. Achilles jerk is not obtained, also because he holds the foot firmly. He rises from the bed with some difficulty to stand on the floor, and sometimes mades two or three attempts before he can get on his feet. Is able to stand with feet together and eyes closed with very little sway. In walking he does not stagger except occasionally. His gait is very fair, either with eyes open or closed. Frequently in sitting down he looses his balance and falls backwards.

Summary: F. S., forty-eight years of age, (Sept. 22, 1904) had paralysis of upward associated movement with loss of

convergence. Downward movement was possible, but was difficult. Lateral associated movements at this time were preserved. The man had been very alcoholic. The speech was bulbar in character, and swallowing had become difficult. The saliva dribbled from the mouth. Ataxia of station was present. Headache was severe at one period. By Dec. 28, 1904, associated lateral and downward movements had become much affected. On Jan. 22, 1905, I examined the patient again and found his mentality poor, speech more indistinct, deglutition difficult, associated upward movements lost, and all other associated ocular movements much impaired. The associated lateral movements were more impaired than the lateral movements of each eyeball separately. The upper limbs were slightly ataxic. Gait was fair, but frequently when he sat down he would lose his balance and fall backwards.

In this case paralysis of upward associated movement developed first, and was followed by paralysis of downward and of lateral associated movements.

Case 5. The report of this case was read by Dr. Zentmayer before the Ophthalmological Section of the College of Physicians.

A. S., male, aged fifty-seven years, butcher, was referred to me by Dr. Zentmayer, Dec. 3, 1904, with the following notes:

"He has had six children, all but two of these died before they were three years of age, one child is still living, aged twenty-nine years, the other died of phthisis. His first wife died of phthisis.

"O. D. 6/ix pt. O. S. 6/xii pt.

"One year ago he had lumbar pain and headache for two days. On the evening of Nov. 29, 1904, after returning from the theater, he found that he was dizzy and that his sight was blurred. He slept well, and the following morning had diplopia (?) on reading, also some nausea and frontal headache. He smokes and drinks to excess. His weight is 200 lbs., and he has not lost nor gained.

"He sits with his head thrown back. The eyes at rest drop slightly below the horizontal plane. There is apparently retraction of the upper lid. The upper lid touches the upper margin of cornea in O. D. In O. S., 1 mm. of sclera shows. On attempting to fix horizontal nystagmus and tremor of inferior fibers of orbicularis develop. Convergence is weak and nystagmic. Lateral conjugate movements are full but accompanied by short nystagmic jerks. Both conjugate and individual upward movement of globes are abolished. At times there is apparently some very slight upward movement of O. D. Right fissure 10 mm. Left 11 mm. Irides react to light and attempted convergence. O. S. iris somewhat sluggish to

light. Ophthalmoscopic: peripheral lenticular opacities. Disc red gray with incipient neuritis (?). Veins dark and somewhat engorged. Arteries are a trifle small. Fields, O. D. white contracted to 20°, red contracted to 12°. O. S. white 20° above, 40° laterally, red 10° above, 15° laterally, no scotoma."

Notes made by me Dec. 3, 1904, are as follows:

He has had headache more than a year, and this he describes as a "kind of heavy feeling" in front of head and not a sharp ache. He drinks a large amount of beer and some gin, and smokes much. He has not been getting weak. He has not had any pains in his limbs, except in winter time he has had some rheumatic pains in his hands. He has poor appetite and indigestion.

He has slight drooping of each upper lid, and does not raise his eyes above the horizontal in attempting to look upward, and has then fine lateral nystagmic movements. The movements to the right and left seem to be fully normal, but toward the left he has slight nystagmic movements. Downward movements are normal. The pupils are equal. The reaction of the iris to light and in accommodation is good in each eye, except that the reaction to accommodation in the right eye is not quite so good as in the left eye. He converges with both eyes, but better with the left, and when he converges the upper lids tremble. Hearing for watch is excellent in each ear. The masseter contracts well on each side. There is no involvement of the facial nerve on either side. Sensation for touch and pain in the face and hands and lower limbs is normal. The grasp of the right hand is excellent, the left hand is on a splint because of a recent injury. The biceps and triceps reflexes of each upper limb are not distinct. The patellar reflex is weak on each side, but this probably is because it is impossible to get him to relax his limbs, and it is increased by reinforcement. The gait and station are normal, with eyes open or closed.

On Dec. 29, 1904, Dr. Zentmayer sent me the following note:

"Ten days after you saw A. S. there was noted a marked improvement in supraduction, and 4 days later he complained for the first time of diplopia, and a careful study of the movements of the eyes showed that there remained only a paresis of the left superior rectus. Yesterday all of the muscles (intra- and extra-ocular) seemed to have regained their full power. There is still glycosuria.

Summary: A. S., fifty-seven years of age, (Dec. 3, 1904) suddenly became dizzy and complained of blurred sight. He had used alcohol and tobacco to excess. Convergence was weak and nystagmic. Associated lateral movements were not

limited, but were accompanied by short nystagmic jerks. Associated upward movements were lost. Reaction to light was preserved. The disc was red gray with incipient neuritis.

I saw the patient Dec. 3, 1904. He had been having headache. He had slight drooping of the upper lids. He had no signs of implication of his nervous system other than those mentioned.

Ten days later there was marked improvement in supra-

FIG. 11. Attempt to look upward. Forehead is wrinkled, but eyeballs do not move upward. (Case 6.)

duction and four days later he complained for the first time of diplopia. There was then only paresis of the left superior rectus. By Dec. 28, 1904, all the ocular muscles had regained their full power.

Case 6. S. Hea., sixty-three years old, referred for examination by Dr. de Schweinitz, Dec. 14, 1904.

The patient is married and has six children. He attributes his condition to the atmosphere from oil works. He has tremor, especially in the lower limbs. He denies all venereal diseases. He has been very alcoholic and has had difficulty in

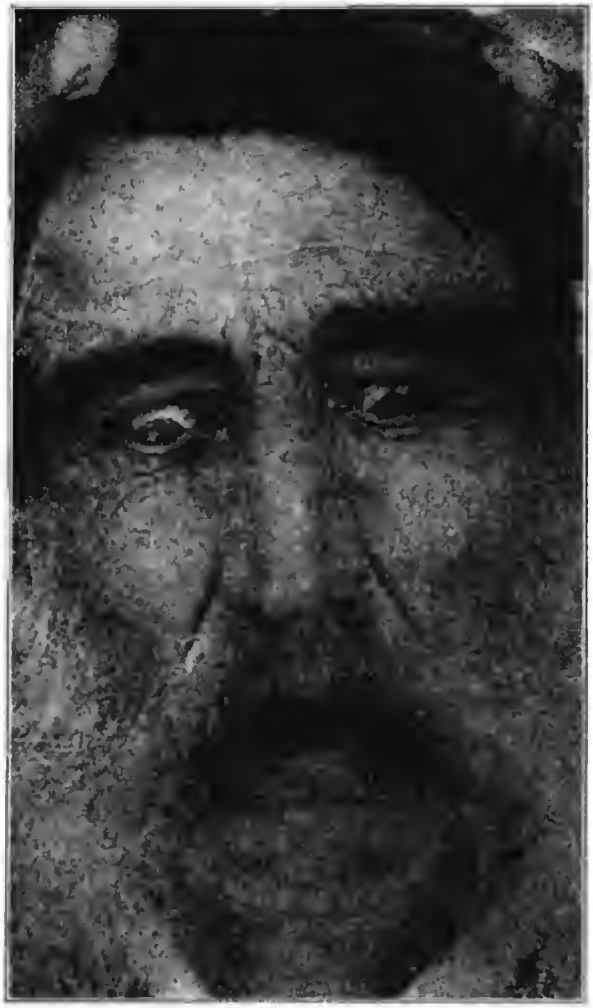

FIG. 12. Downward movement of eyeballs well performed. (Case 6.)

breathing. Has had headache every night about 8 o'clock, disappearing during sleep. Has bearing down pain across abdomen. Many members of his family have died from cancer.

He weighed 181 lbs. a year ago, now weighs 145. No dizziness. Staggers in walking. Is weak in his whole body, "can't carry ten pounds."

He cannot look upward at all, but moves his eyeballs freely in all other directions. There may be some weakness of the right external rectus. The pupils are about equal, reaction to light is present in each eye, distinct but not very prompt. He can converge with each eye. Reaction of each iris in convergence and accommodation prompt and better than to light. No involvement of either facial nerve. Masseters contract firmly. Sensations for touch and pain seem to be normal everywhere. Can hear a watch with right ear only when the watch is pressed against the ear, cannot hear it with the left ear at all. Hears the voice, but says his hearing has become impaired. Soft palate moves freely, tongue normal. Grasp of each hand fair, but not powerful. Biceps and triceps jerks not prompt on either side. Patellar reflex is much diminished on each side. Ankle clonus is persistent on each side, more so on right. Babinski sign is uncertain, but probably present on each side. Sensations for touch and pain normal in the feet. He does not stagger when walking in the room or when standing, with eyes closed or open, but says he staggers on the street. Resistance to passive movements good in all the limbs. The tremor in the right lower limb seen while under my examination appears to be the result of ankle clonus.

Summary: S. H., sixty-three years old (Dec. 14, 1904), had been very alcoholic. He had tremor of the lower limbs, headache, slight ataxia, some subjective weakness of limbs, and complete paralysis of upward associated movements; all other associated movements were normal. Convergence was preserved. The patellar reflexes were diminished. Ankle clonus was present on each side, but Babinski's sign was uncertain.

Case 7. T. Roberts, male, a patient of Dr. de Schweinitz, was examined by Dr. C. K. Mills and myself about Nov. 12, 1904. The man was not ataxic. He could not see light, and had paralysis of upward and downward movements. Dr. de Schweinitz's notes, Nov. 29, 1904, are as follows:

"There is complete blindness, the ocular examinations showing choked disc, beginning to subside with the development of atrophy. He stated that severe headaches had been present before the blindness came on. There was also at times nausea. Headaches have been better, and I believe have been practically absent since the blindness, which he maintains appeared suddenly some months ago. So far as we can determine, there is entire loss of the upward and downward movements of the eyes, therefore failure of associated parallel movement upward and associated parallel movement downward. There is no failure in the power

of the eyes to move in associated parallel direction directly to the right, or in a similar direction directly to the left, that is to say, no failure in dextroversion or levoversion. Movement of convergence is present, that is to say, if he is told to look at his own finger, which he rapidly approaches to within a few inches of his eyes, there is convergence of the eyes to this point."

Summary: T. Roberts had paralysis of associated upward and downward movements and was completely blind and had choked disc. He had had severe headache. Lateral associated movements were normal, and convergence was preserved.

FIG. 13. Looking to the left. Slight weakness of left external rectus. (Case 8.)

Case 8. Mrs. McM., a patient of Dr. Wm. J. McConnell, aged fifty years, was seen by me in consultation with Dr. McConnell Jan. 15, 1905, when I made the following notes. The history and photograph were obtained from Dr. McConnell:

She has had 9 children, no miscarriages. Lungs and heart

are normal. Urine has shown albumin and hyaline casts. In Oct., 1904, had her first convulsion, nature of which is not known. Had later another which she says began with numbness in left hand. Since first convulsion has had severe persistent occipital headache, occasionally nausea and vomiting, and she says dizziness. Some ataxia of gait has been observed.

FIG. 14. Attempt to look upward. Wrinkling of forehead in attempt to look upward, but eyeballs do not move upward at all. (Case 8.)

Complains that her sight is not so good as formerly. Last Monday (Jan. 9) had a third convulsion beginning, she said, with numbness of left hand, and since then mental state has been a little dull. She has lost flesh.

Present condition. Partial ptosis which the patient cannot overcome. Each upper lid droops as low as the center of the pupil when she is looking directly forward. Paresis distinct in upward movement, raises the eyeballs only slightly above the horizontal. Some weakness apparently of left ex-

ternal rectus. Convergence completely lost. No paralysis of associated lateral movements. Movements to right and downward normal, and usually movements to left normal, but there may be some weakness of left external rectus, and occasionally when left eyeball does not go as far as it should to the left the right eyeball also does not go as far as it should to the left. Slight indication of nystagmus in looking to right. Pu-

FIG. 15. Attempt to converge, showing power of convergence lost. (Case 8.)

pils equal and reaction to light prompt. Movements of 7th and 5th nerve supply normal. Tongue protruded straight and not affected. No deafness to the voice. Sensation for touch and pain normal everywhere.

Upper limbs not distinctly ataxic. Biceps and triceps tendon reflexes are not distinct. Movements of the upper limbs are normal. No loss of stereognostic perception nor of sense of position.

Gait slightly ataxic, sometimes falls toward left, sometimes

toward right. Patellar reflex not exaggerated. No ankle clonus, Achilles jerks not distinct. No Babinski, toes seemed to be flexed. Voluntary power in all limbs fair, no paresis. No one has ever seen the patient in a convulsion.

I saw this patient again Feb. 1, 1905. The ocular palsies had disappeared, she could raise her eyeballs and upper lids fully, her intelligence was good, she walked well. She had been taking large doses of mercury and iodide. The case appeared to be one of syphilis.

Later the paralysis of associated upward movements returned but disappeared under the same treatment.

Summary: Mrs. McM., fifty years of age (Jan. 15, 1905), had convulsions, headache, nausea, vomiting, dizziness, ataxic gait, failure of sight. I found, Jan. 15, 1905, partial, bilateral ptosis, marked impairment of upward associated movements and loss of convergence; other asociated movements were preserved. The left external rectus was weak. Gait was slightly ataxic.

When I saw this patient again, Feb. 1, 1905, the ocular palsies had disappeared, and she could raise her eyeballs and upper lids fully. She had been taking large doses of mercury and iodide. Later the paralysis of associated upward movement returned and again disappeared under the administration of mercury and iodide.

Noteworthy in this case was the association of partial bilateral ptosis and paresis of the left external rectus with paralysis of upward associated movements; also the disappearance of the ocular palsies twice under the administration of mercury and iodide.

Case 9. W. B. was a patient of Dr. Wharton Sinkler, from whom the following notes were obtained. An opportunity was given to me to examine this patient.

W. B., insurance agent, aged twenty-eight years, was admitted Oct. 10, 1903.

Family history. His mother died from cancer. His father is living. Two brothers and three sisters are living and well.

Previous history. He had measles, pertussis, chicken pox, scarlet fever, diphtheria, and in 1900 syphilis.

He had not used alcohol or tobacco for 5 years. Before that time used both to some extent.

He has worried a great deal about business and felt that he was becoming nervous. May 10, 1903, he developed a right hemiplegia, affecting the arm first, then the leg, although the leg was never completely paralyzed, and he could walk around. Speech was not affected. Oct. 8 he developed diplopia.

On admission he complains of intense headache and diplo-

pia, also of weakness in the right arm and leg, although he can walk and get around fairly well. He also complains of biliousness.

The bowels are regular, appetite has been very poor for the past few weeks, before that time it was very good. Sleep is good.

Heart and lungs are negative.

He has no gastric crises; no shooting pains or girdle sensation.

Reflexes are greatly exaggerated on the right side; slightly so on the left. Dynamometer, R=10. L=65.

The clavicles are very prominent and there is an enlargement of the inner end of the right clavicle. Interspaces are prominent.

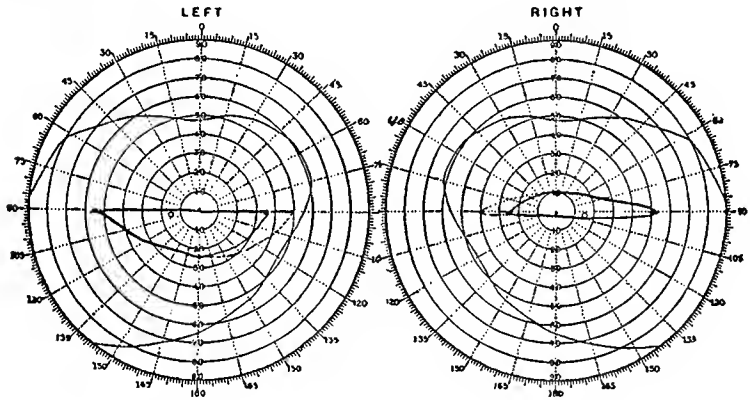

FIG. 16. Upward movement was abolished in the left eye, and was very slight in the right eye. Downward movement was lost in the right eye and was much impaired in the left eye, although it was greater than the upward movement of the right eye. Associated movements were nearly normal in each lateral direction. Convergence movements were lost. Rotation. fields of fixation. Right out = 50, right up = 10, right in = 25-40, right down = 0. Left out = 55, left in = 25-40, left down = 25.

Eyes. Report from Dr. De Schweinitz's clinic book:

O. D. 6/6+40.50, p.p 25; O. S. 6/6+4 O. S. 0.50 p.p 25. Paralysis of accommodation. Lateral outward rotations normal in both eyes; slight loss of inward rotation of each eye. Complete loss of downward movement of right eye, and partial of left eye. Nystagmic movements in both when rotated to extremes of fixation. No choked disc, although slight veiling of right disc; vessels normal. Right pupil—4 mm., faint reaction to light. Left pupil —2 mm., prompt light reaction. No convergence movement, but associated movements are nearly normal in lateral directions.

Nov. 7, 1903. Much improved. Almost all movements restored except downward of right eye, which is still deficient.

Treatment: massage, protiodide gr. 1-6 t.i.d., KI. gr. v increasing.

Oct. 19, 1903. For the past few days the patient has exhibited some mental symptoms, consisting of delusions. He thinks he has recently been married and has a child. That he has a contract to build a depot. That there is a jeweler's shop in the hospital, and that the goods are being auctioned off. At present there is decided mental deterioration.

Nov. 4, 1903. The patient to-day became sick at the stomach and vomited. He also had diarrhea and lost control of the bowels. He is still very much confused, and several times has appeared in the hall without any definite cause. He wanders about. His mental states is unimproved. KI and mercury are discontinued.

Nov. 6, 1903, The patient is discharged to-day somewhat improved. The eyes have recovered considerably from the loss of movements. Speech at present is quite thick and drawling in character. Mental state is poor.

Summary: W. B., aged twenty-eight years, had contracted syphilis in 1900. Right hemiplegia developed May 20, 1903, and in October of the same year he had diplopia. Headache became intense. Upward movement was abolished in the left eye, and was very slight in the right eye. Downward movement was lost in the right eye and was much impaired in the left eye, although it was greater than the upward movement of the right eye. Associated movements were nearly normal in each lateral direction. Convergence movements were lost. The pupils were unequal, and reaction to light in the right eye was faint, but prompt in the left eye. Optic neuritis was not present, but there was a little veiling of the right disc. Each ciliary muscle was completely paralyzed. Convergence was lost.

By Nov. 7, 1903, the patient was much improved, and almost all the ocular movements were restored, except the downward movement of the right eye.

ABSTRACTS OF THE CASES OF PARALYSIS OF UPWARD OR DOWNWARD ASSOCIATED OCULAR MOVEMENTS REPORTED BY THE LITERATURE.

The original papers, with three exceptions, were obtained and the abstracts were made by me from these.

Henoch[20]: The eyes were turned downward, and the child could not raise the eyes upward. Lateral movements were normal. Pupils were somewhat dilated and reaction was slow. Later were vomiting, drowsiness, paresis of the right arm, irregular pulse; still later, complete paralysis of the

[20] Henoch. Berliner klin. Wochenschrift, March 21, 1864, p. 125.

right limbs and right side of the face, deviation of the right eye inward. The lesions were tuberculous meningitis and tubercle of left posterior part of the corpora quadrigemina. It is not stated whether the third nerve nuclei were normal.

Wernicke[21]: After an apoplexy the symptoms were left hemiplegia, great limitation of upward and downward movements of the eyes, with normal lateral movements. There were no ptosis and no changes in the fundus. An apoplectic focus was found in the right optic thalamus, lenticular nucleus and anterior part of the right side of the corpora quadrigemina. The oculomotor nucleus was involved on the right side.

Priestley Smith[22]: Case 4. The symptoms were headache, vomiting, vertigo, diplopia. The eyes maintained a constant convergence toward a point two feet distant from the face, and the patient was unable to diminish to the smallest extent the convergence, nor could he increase it very much. Vertical movement upward above the horizontal plane was totally lost. Both eyes followed an object to the normal extent to the right or left. The patient steadily improved and he became able to look upward, but the ocular symptoms returned and the parallel conjugate movements were less free than at the former examinations. Tested by the horizontal and vertical movements of an object before the face, each eye was found to have the following range:

Outward, only a little beyond the median line, and much unsteadiness and jerking attended the effort.

Inward. to the full extent, but with a little jerking.

Downward, apparentlv to the normal extent.

Upward, no movement was possible above the horizontal line, and much jerking attended the effort. There was no necropsy.

Case 5. The symptoms were headache and vertigo, followed by sudden unconsciousness lasting one day, and supposed to be hysterical. One or the other eye deviated inward. The outward, inward and downward movements of the eyes were nearly or entirely to the full extent, but upward movements were not more than half the normal extent. The ocular symptoms later disappeared.

Nieden[23]: The symptoms developed suddenly. The patient, a man aged 45 years, became blind while bending over. Examination showed that vision was much impaired. The eyeballs could be moved promptly downward, outward or inward, but not upward beyond the horizontal line. When the attempt was made to look upward the eyeballs were drawn backward and forward in a peculiar manner. There were no fundus changes. The lesion was supposed to be a cerebral hemorrhage. Recovery in this case was complete.

Gowers[24]: The symptoms were headache, vomiting, weakness of the legs, a few convulsions. The patient's manner was suggestive of hysteria. She had well-marked double optic neuritis. The eyes moved freely in all directions but upward. When she tried to look upward the eyes moved very little or not at all above the horizontal line. The pupils were equal, 4 mm. in diameter, acting very little to light and not at all on attempts at accommodation. The patellar reflexes were much exaggerated. A very small tumor was found in the middle line behind the posterior quadrigeminal bodies, damaging these slightly, the velum and the adjacent part of the inferior vermiform process of the cerebellum.

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[21] Wernicke. Berliner klin. Wochenschrift, July 3, 1876, p. 394. "Lehrbuch der Gehirnkrankheiten," Vol. 2, p. 84.

[22] Priestley Smith. Ophthalmic Hospital Reports, 1876, Vol. 9, p. 22.

[23] Nieden. Centralblatt für prak. Augenheilkunde, July, 1880, p. 209.

[24] Gowers. Transactions of the Ophthalmological Society of the United Kingdom, Vol. 1, 1880-81, p. 117. A Manual of the Diseases of the Nervous System, Sec. Edition, p. 185.

Parinaud[25]: Case 4. A man, 67 years of age, had had attacks of polyuria and heaviness of the head 18 months. In one of these he had difficulty in standing and the vision was disturbed; he had a tendency to fall to the left. At the same time he had complete paralysis of upward and downward movement of the two eyes, except that the right eye could be moved upward a trifle. Movements to the left and right were normal. Convergence was lost. The upper lids were normal. The pupils were moderately contracted and a little unequal. The reaction to light was lost. The visual fields and central vision were normal. The pulse was slow. No necropsy was obtained.

Case 5. A woman, 20 years of age, had had headache, especially on the left side, about a month. Diplopia suddenly developed. A month later she was found to have complete paralysis of convergence. Lateral associated movements were normal, as were also downward movements, while upward associated movements were almost lost. Crossed diplopia was present. There was no lesion of the fundus, and no amblyopia. Several times numbness of the left lower limb occurred, and was followed by some weakness.

Ormerod[26]: A man, aged 44 years, had paresis of the upward movement of the eyes, most marked in the right eye, especially when the patient looked to the right. There was vertical nystagmus when he tried to look upward. The other ocular movements were normal. There was no definite neuritis. The symptoms had been present ten months, but he had had a similar condition fifteen years previously.

Otto Hope[27]: The symptoms were: Headache, general tremor occurring in attacks, right-sided deafness and vomiting. The patient was unable to raise his left eye above the horizontal, and the right eye he could raise only slightly; the downward movement of the eyes was much impaired. Lateral movements were normal. He had reflex rigidity of the pupil, and slightly choked discs. The limbs were not paralyzed. A tumor the size of a pigeon's egg was found in the corpora quadrigemina; the aqueduct was preserved only in the posterior half. The tumor was a telangiectatic sarcoma.

Reinhold[28]: The symptoms were vertigo, headache, paresis of each external rectus, vomiting, disturbance of vision without optic neuritis, bilateral ptosis and limitation of upward movement of the eyes, with nystagmus. A gliosarcoma of the pineal gland was found. The corpora quadrigemina and the aqueduct of Sylvius were compressed, but the tumor was easily separated from the former.

R. Thomsen[29]: The symptoms were failure of memory and intelligence, headache, vertigo, weakness, tremor, rigidity of the limbs, small and unequal pupils, iritic reflex to light lost on the right side and weak on the left, pallor of discs. Both eyes could be moved to the right, left or downward, but with nystagmus. The eyes could scarcely be raised above the horizontal, and the right was more affected. A gumma was found at the exit of the oculomotor nerves and growing into the peduncles and implicating the nucleus ruber, and especially the fibers of the right oculomotor nerve within the peduncle. Ependymitis diminished the size of the aqueduct of Sylvius considerably, but the gray matter about the aqueduct and the oculomotor nuclei appeared to be normal. Nissl's method was not employed. There seems to have been no compression of tissue by the gumma.

[25] Parinaud. Archives de Neurologie, Vol. 5, No. 14, 1883, p. 145.
[26] Ormerod. Brit. Med. Journ., March 22, 1884, p. 564.
[27] Otto Hope. "Ueber einen Fall von Tumor der Vierhügel," Inaug. Dissertation, Halle a S., 1888.
[28] Reinhold. Deutsches Archiv. für klin. Med., Vol. 39, 1886, p. 1.
[29] Thomsen. Archiv. für Psychiatrie, Vol. 18, 1887, p. 616.

Nothnagel[30]: A male, 24 years old, presented the following symptoms: Headache, diplopia, paresthesia of left limbs, epileptic attacks, choked discs, paresis of the left upper and lower limbs, ataxia of the left upper limb, and objective disturbance of sensation in the left upper and lower limbs and left side of face. The left abducens was paretic. Upward and downward movements of each eye were much impaired. Lateral movements, except outward movement of the left eye, seem to have been good The left facial nerve was paretic for voluntary movements. There was no necropsy at the time of the report.

Samuel Gee[31]: The patient was six years of age. The symptoms were loss of appetite, vomiting, headache, ataxia, convulsions followed by inward squint of the eyes lasting three days, then the eyes began gradually to turn upward. About the same time the power of the limbs was lost. The head was retracted. Both eyes were turned upward, so that the corneæ were concealed by the upper lids. The right eye also turned a little outward. There was constant vertical nystagmus, no ptosis. The discs were white, their margins blurred and their vessels small; *i.e.*, they were atrophic and probably secondarily to optic neuritis. Palsy of the limbs was very incomplete, and there was no rigidity.

A pulpy, gelatinous mass was found over the surface of the cerebellum above and behind the medulla oblongata, a large, bleb-like sac distended with fluid bulged out between the crura cerebri. The corpora quadrigemina were flattened and "distended over a mass of gelatinous pink new growth which formed the anterior projecting extremity of a mass of similar new growth filling the whole cerebellum." The growth was considered to be sarcomatous.

Evidently the eyes could not be directed downward in this case, because it is stated that it was difficult to get a view of the fundus on account of the position of the eyes.

Eisenlohr[32]: The symptoms were drowsiness, vertigo, later tremor of the left arm, dilatation of the right pupil, slow reaction of the pupils, no changes in the fundus; still later, limitation of movements of eyes, especially upward and downward, polyuria, headache, vomiting, stupor, ataxic gait; still later, choked discs, right-sided ptosis. A bullet wound was found in the right side of the corpora quadrigemina. A portion of the third nucleus was injured.

Lichtheim[33]: Case 1. In addition to the signs of brain tumor, one abducens became paralyzed, and was followed soon by paralysis of upward movement of both eyeballs, optic atrophy and rigidity of the pupils. A glioma occupied the whole of the corpora quadrigemina and had grown into the right optic thalamus.

Case 2. The symptoms were vertigo, ringing in the ears, paralysis of one abducens and paralysis of upward movement of both eyeballs. Choked discs were present, and later ataxia. The tumor was in the corpora quadrigemina and optic thalamus.

Case 3. The symptoms were headache, diarrhea, vomiting, ataxia and weakness of the right side of the body. The left abducens was paralyzed, and there was paralysis of upward movement of the eyeballs and optic neuritis. A caseous tumor was found in the corpora quadrigemina, not involving the anterior part of this structure.

The abducens paralysis was attributed to pressure upon the nerve at the base of the brain, and was present in all three cases.

Parinaud[34]: The patient, a man, became paralyzed in the left side of

[30] Nothnagel. Wiener med. Blätter, 1889, No. 9, p. 131.
[31] Gee. Saint Bartholomew's Hospital Reports, Vol. 26, 1890, p. 106.
[32] Eisenlohr. Münch. med. Wochenschrift, May 20, 1890, p. 364.
[33] Lichtheim. Deutsche med. Wochenschrift, Nov. 17, 1892, p. 1043
[34] Parinaud. Annales d'Oculistique, 1892, Vol. 107, p. 283.

the face and in the left upper limb. The lower limb seems to have escaped, and the weakness of the left upper limb was of short duration, except in the fingers. He was almost completely unable to look upward, and lateral movement to either side was very imperfect. He was able to look downward without difficulty. Convergence was normal. The pupils were of normal size, and the iritic reaction was normal to light and convergence. There was no lesion of the fundus. He had partial left homonymous hemianopsia. Parinaud localized the lesion in the cortical center of the face and adjoining region.

It is noteworthy that in this case reported by Parinaud himself convergence was normal.

Verrey[35]: The paralysis of associated upward and downward movement of the eyes developed suddenly, and was associated with a tendency to deviation to the left in walking. The symptoms lasted only a few weeks. A small hemorrhage was supposed to have occurred in the corpora quadrigemina or near this region.

Sharkey[36]: The patient, a man aged 43 years, became stuporous, deaf in the right ear, numb in the right half of the body, had right hemianopsia and paralysis of the superior rectus in each eye, and of the inferior oblique of the right eye. Both pupils reacted to light and accommodation, but sluggishly. There was no optic neuritis. Sensation was affected in the right side of the body. Speech was thick. Mr. Nettleship found that there was no movement of the eyes upward beyond the horizontal, and that downward movement was also defective, especially in the right eye. Concomitant lateral movements were full, but convergence was very defective, especially in the right eye. Irregular nystagmus was present in lateral and in upward movements. Fundi were normal.

Later, loss of power was noticed in the right side, and optic neuritis developed. A tumor was found in the corpora quadrigemina and upper part of the left cerebral peduncle.

Sauvineau[37]: A woman, aged 73 years, had an apoplectic attack with transitory right hemiplegia at the age of 70. Three years later she had another apoplectic attack with slight right hemi-paresis, and at the time of examination by Sauvineau she was a little weak in the right side. She did not have strabismus nor ptosis, and lateral movements of the eyeballs were normal, although they were associated with a little rotary nystagmus. Upward movement was lost in both eyes, and downward movement was feeble and associated with vertical nystagmus. Convergence was lost. At times she had diplopia. The pupils were equal and of normal size, and reaction in accommodation was normal. The light reflex was preserved, but feeble on the right side, and abolished on the left. No fundus changes were present, and the visual fields were normal. There was no hemianopsia. Sugar was present in the urine.

Schroeder[38]: The case was remarkable, as the paralysis of associated movement was downward. As cited by Teillais, a man 31 years old, was suddenly attacked with fever, headache, vomiting, convulsions of the limbs, complete ophthalmoplegia and amblyopia. After four or five weeks most of the symptoms disappeared, but there was complete paralysis of associated movement downward, and the eyes could not be moved downward below the horizontal. If he tried to look downward a spasm of the elevators occurred and the eyes were raised. No explanation was offered.

W. E. Bruner[39]: The chief symptoms were right hemiparesis and im-

[35] Verrey. Revue Médicale de la Suisse Romande., 1893, Vol. 13, p. 220.

[36] Sharkey. Brain, Vol. 17, 1894, p. 238.

[37] Sauvineau. Receuil d'Ophtalmologie, 1894, p. 592.

[38] Cited by Teillais. Annales d'Oculistique, Vol. 122, 1899, p. 19.

[39] Bruner. Columbus Med. Journ., Vol. 14, 1895, p. 505.

paired vision. The movements of the eyes were perfectly normal in all directions except upward, in which direction there was scarcely any movement at all, not more than five degrees, but there was no diplopia. Slight nystagmus was observed when the patient attempted to look upward. No necropsy.

Hoesslin[40]: A boy, 9 years old, had had increased thirst and polyuria, headache, vomiting, ataxia, loss of muscular power in the lower limbs, and pupils dilated *ad maximum*. The eyes could be moved to the left, right and downward, but upward movement above the horizontal was impossible. He had bilateral choked discs. Both superior recti, both inferior oblique and the sphincter pupillæ were paralyzed. A spindle cell sarcoma was found growing from the pineal gland and corpora quadrigemina.

C. K. Mills[41]: The patient was unable to raise his eyes beyond the horizontal plane. The left eye diverged slightly, but there was no true lateral paralysis. The pupils were equal, reacting to light and in accommodation, both individually and consensually, but their movements were sluggish. The right field was concentrically limited to a decided degree, and slight concentric limitation was present on the left. The media and fundi were healthy. The central acuity of vision was 20-40 in the right eye and 20-30 in the left. Examination showed difficulty in speaking. The tongue was protruded slightly and a little to the left, and the patient showed some tendency to drooping. He complained of a general feeling of weakness in both legs. Both knee-jerks were exaggerated and a slight, probably spurious, ankle clonus was present on the left side.

Nothnagel[42]: Case 3, as given by Bach, there was bilateral ptosis. The movements of the eyes, especially of the left, were much impaired outwards and upwards. A tumor was found in the third ventricle, and the aqueduct of Sylvius was displaced. Pressure was probable upon the ocular nuclei and root fibers.

Basevi[42]: As given by Bach, associated paralyses were present (oblique superior and inferior rectus muscles, with disturbance of convergence). The corpora quadrigemina were scarcely recognizable.

Teillais[43]: There was complete paralysis of upward and downward movement of the eyeballs, with integrity of lateral movements, also complete paralysis of convergence, and yet the internal rectus of each side showed no impairment in lateral movements. The irides reacted to light, and the pupils were equal. There was no lesion of the fundus, no amblyopia, and the visual fields were normal. This condition lasted two months.

The man had syphilis and diabetes. The symptoms began in an apoplectic attack, and he remained almost unconscious a month without paralysis of the limbs. Only during the first day of his attack had he any difficulty in raising the eyelids. He had very few signs, other than the ocular, of involvement of his nervous system. He was very drowsy and slept much, and his intelligence was affected. He had dysarthria, and the left upper limb was used in preference to the right, and the tendon reflexes on the right side were prompter. No necropsy was obtained in this case.

Poulard[44]: The patient had an apoplectic attack and loss of consciousness during six hours. Following this she had diplopia. Upward movement, and movements to right and left were normal, but associated downward movement was almost entirely lost; the pupils did not pass below the horizontal, and the patient was unable to follow an object downward. Convergence was much affected. There was some insufficiency of the left

[40] Hoesslin. Münch med. Wochenschrift, March 31, 1896, p. 292.
[41] Mills. "The Nervous System and Its Diseases," 1898, p. 833.
[42] Bach. Zeitschrift für Augenheilkunde, Vol. 1, 1899, pp. 315, 455.
[43] Teillais. Annales d'Oculistique, Vol. 122, p. 19.
[44] Poulard. Revue Neurologique, 1901, p. 158.

internal rectus, and also insufficiency in elevation of the left eye, although it was impossible to say whether the superior rectus or inferior oblique was at fault. In going down stairs the woman flexed the head *ad maximum*. The iritic reflex to light and visual acuity and visual fields were normal. Nervous symptoms, other than ocular, were slightly marked, the legs were a little stiff at times, and the tendon reflexes were exaggerated. There was no necropsy in the case.

Gordinier[45]: The patient was a man, aged 21 years. He had double optic neuritis, passing on to atrophy, intense and continuous headache, vomiting, dizziness, slow cerebration and gradual loss of memory, internal ophthalmoplegia, with double incomplete external ophthalmoplegia, marked cerebellar gait, coarse tremor of the hands, ataxia in the left leg, and choreiform movements. It is stated that there was slight convergence of eyeballs, and that the movements of the eyeballs were normal except upward and downward movements, both of which were practically abolished, and that there was slight double ptosis.

A neuroglioma, measuring 4x3x2½ cm., was found projecting from the superior worm of the cerebellum. It had involved by actual ingrowth the posterior part of the corpora quadrigemina on each side, and had destroyed almost completely the interior of the right posterior colliculus, leaving but a superficial shell of cortex; the left posterior colliculus being similarly, although much less, involved. The anterior colliculi did not appear to be affected. The aqueduct of Sylvius was occluded, the third nerve nuclei were distorted, and the left nucleus contained a less number of cells than its fellow of the opposite side. The nucleus of each side contained numerous atrophic cells devoid of processes and without nuclei; other cells had lost their processes and showed much alteration. The dorsal part of the oculomotor nuclei was most affected.

Crouzon, Marie, Babinski[46]: The patient, a man, had an apoplectic attack lasting seventeen hours, and became blind. During the attack he did not have stertorous breathing nor evacuation of the bladder or bowels. The coma disappeared suddenly, but the patient was delirious for several weeks, and did not recognize persons or objects. The speech was slow and hesitating and the visual fields were contracted. The eyeballs were turned upward; when he threw his head as far backward as possible and followed with his eyes a finger slowly lowered the eyeballs moved downward, but if his head were erect and he attempted to look at his feet he bent his head forward and the eyeballs went forcibly backward.

Raymond and Cestan[47]: Case 3. A man, 43 years of age, had left sensori-motor hemiplegia. Eight days after a severe mental shock his speech became affected and he became paralyzed on the left side and had diplopia. The tendon reflexes on the left side were exaggerated and Babinski's sign was obtained. There was no ptosis. The fundus was normal. The pupils were equal, and the reaction to light and in accommodation was normal. The man had paralysis of associated ocular movements both toward the left and toward the right, but more toward the left. There was also marked paralysis of upward associated movement. Downward associated movement was almost normal. Convergence was slightly affected. No necropsy was obtained. This condition had existed ten years.

Noguès and Sirol[48]: A woman, 50 years of age, had been in bed about three weeks because she had lost her appetite, had difficulty in sleeping, had lassitude and was unable to work, had chills, and probably fever, with palpitation. She noticed the first day she arose from her bed that she

[45] Gordinier. JOURNAL OF NERVOUS AND MENTAL DISEASE, Vol. 28, 1901, p. 543.

[46] Revue Neurologique, 1901, p. 428.

[47] Raymond and Cestan. Revue Neurologique, 1901, p. 70.

[48] Noguès and Sirol. Revue Neurologique, 1901, p. 290.

could not look upward. She was found to be unable to look above a certain point a little below the horizontal. Downward and lateral movements and convergence were normal. When the upper lids were lowered she could raise her eyes above the point she could reach if her eyes were open. The fundus was normal. There seemed to be no other signs of organic disease of the nervous system. Because of the absence of an apoplectic seizure and of other symptoms of an organic nature, and of paralysis of convergence, and because of certain hysterical manifestations and of the probably sudden development of the paralysis, Noguès and Sirol regarded the paralysis of upward associated movement as hysterical. It seems to me the hysterical nature of this case has not been established.

Kornilow[49]: Case 1. A child, 6 years old, had complete paralysis in upward and downward movement, some impairment of convergence, and slight slowness in the reaction in accommodation and light. Movements of the eyeballs laterally were normal. Recovery in this case was almost complete.

Case 2. A child, 4 years old, had slight bilateral ptosis, and the left eyeball was turned somewhat inward. Movement of the eyeballs toward the right was almost normal, downward entirely normal, but toward the left the movement was much impaired, especially in the left eye, and upward associated movement was almost impossible. Convergence was normal.

The first case was supposed to be one of poliencephalitis superior of Wernicke; the second, one of tubercle.

In the first case there was slight weakness of the lower part of the right facial nerve supply and of the right hypoglossus; in the second, paresis of the right facial nerve and of the right upper and lower limbs. Ataxia was present in both cases.

Posey[50]: Case 1. Given in detail by me as Case 4 (Frank S.) of my report.

Case 2. The patient, a woman, was 65 years of age. She had had an attack of apoplexy and was hemiplegic on the right side. Neither eye could be rotated above the horizontal plane, though the other movements, including convergence, were preserved. The reaction of the irides to light and in accommodation was sluggish. The pupils were nearly equal, 3 mm. and 2½ mm., respectively. The fundi were normal. Corrected vision equaled 5-6 in each eye. There was no hemianopsia. The condition was unchanged after two years.

J. Porter Parkinson[51]: A girl, 11 years of age, began to stagger when 7 years of age. Sight failed. Headache did not occur. Movements of hands were incoördinate. The deep reflexes were increased. Hearing in the left ear was slightly impaired. Reaction of pupils was sluggish to light and in accommodation. The upward and lateral movements of the eyes were limited, especially the former. Discs were pale, but there was no evidence of optic neuritis. Speech was slow and hesitating. Necropsy was not obtained.

[49] Kornilow. Deutsche Zeitschrift für Nervenheilkunde, Vol. 23, 1903. p. 417.

[50] Posey. Annals of Ophthalmology, July, 1904.

[51] Parkinson. The British Journal of Children's Diseases, Jan., 1905, p. 23.

NOTE: Two cases of paralysis of associated upward and downward movements, but not of associated lateral movements, have been reported by Gruner and Bertolotti too late to be included in this paper (*Nouvelle Iconographie de la Salpêtrière*, 1905, No. 2, p. 159). In one case a tumor of the tegmentum of the cerebral peduncles in the region of the corpora quadrigemina was supposed to be present; in the other a tubercle had destroyed the oculomotor nuclei. A clinical case by W. A. Turner (*Brain*, 1898, Vol. 21, p. 341) also should be included.

TABLE SHOWING CASES OF PARALYSIS OF ASSOCIATED UPWARD OR DOWNWARD MOVEMENT.

	Paralysis	Pupils Dilated	Fundus	Lateral Movements	Ptosis	Convergence	Result of Lesion.	Other Symptoms,	Third nuclei.
Henoch 1864	Upward movement	Reaction slow		Normal Later deviation of right eye inward Eyes turned downward			Tub. meningitis and tubercle of l. post. part of corp. quad.	Vomiting, drowsiness, paresis of r. arm, and later, of both r. limbs and r. side of face	Condition not stated.
Wernicke 1876	Upward and downward		No changes	Normal	None		Apoplectic focus in r. optic thal., len. nue. and ant. part r. side corp. quad.	Apoplexy L. hemiplegia	Involved on r. side
Priestley Smith 1876 Case 4	Upward			Normal Later imperfect Downward normal			Result not stated	Headache, vomiting, vertigo, diplopia, constant convergence of eyes	
Priestley Smith 1876 Case 5	Upward			One or the other eye deviated inward Outward, inward and downward nearly or entirely normal			Ocular symptoms disappeared	Headache, vertigo, temporary unconsciousness	
Nieden 1880	Upward		No fundus changes	Downward, outward and inward normal			Recovery complete, lesion supposed to be hemorrhage	Attempts to look upward caused eyes to be drawn backward and forward Vision disturbed	
Gowers 1880-'81	Upward	Acted very little to light, and not at all to accom.	Double optic neuritis	All directions free but upward			Small tumor in middle line behind post. quad. bodies, damaging them slightly	Headache, vomiting, weakness of legs, convulsions, patellar reflexes exaggerated	

TABLE SHOWING CASES OF PARALYSIS OF ASSOCIATED UPWARD OR DOWNWARD MOVEMENT.

Parinaud 1883 Case 4	Upward and downward	Moderately contracted and a little unequal Reaction to light lost		Normal	None	Lost	No necropsy	Polyuria, heaviness of head, difficulty in standing, vision disturbed
Parinaud 1883 Case 5	Upward		No lesions	Normal, as also downward		Lost		Headache, diplopia, numbness of lower limbs, followed by weakness
Ormerod 1884	Upward		No definite neuritis	Other ocular movements normal				Nystagmus looking upward Had a similar attack 15 years previously
Hope 1888	Upward, downward much impaired	Rigidity of pupil	Slight choked discs	Lateral movements normal		Said by Bach to be preserved	Sarcoma in the corp. quad. aqueduct preserved only in post. part.	Headache, gen. tremor, r. deafness, vomiting
Reinhold 1886	Upward		No optic neuritis		Bilateral		Gliosarcoma of pineal gland Corp. quad and aque. compressed	Vertigo, headache, paresis of each ex. rectus, vomiting, disturbed vision, nystagmus attempting to look upward
Thomsen 1887	Upward	Small and unequal Reaction to light affected	Pallor of discs	Right, left and downward normal, but with nystagmus			Gumma involving intramedullary 3d nerves	Failure of memory and intelligence, headache, vertigo, weakness, tremor, rigidity of limbs

Nothnagel 1889	Upward and downward		Choked discs	Lateral movements except outward movement of the left eye seem to have been good			Headache, diplopia, paresthesia of left limbs, epileptic attacks, paresis of left limbs, ataxia of left upper limb	
Gee 1890	Downward		Discs white, margin blurred vessels small, atrophy following neuritis		None	Sarcoma involving corp. quad.	Vomiting, headache, ataxia, convulsions, weakness of limbs, retraction of head. Both eyes turned upward, vertical nystagmus	
Eisenlohr 1890	Upward and downward	R. pupil dilated Reaction slow	Choked discs		Right ptosis	Bullet in right side corp. quad.	Drowsiness, vertigo, tremor of l. arm, polyuria, headache, vomiting, stupor, ataxia	A portion 3d nuc. injured
Lichtheim 1892 Case 1	Upward	Rigidity of pupils	Optic atrophy	One 6th paralyzed		Glioma of corp. quad. extending into r. optic thal.	Signs of brain tumor	
Lichtheim Case 2	Upward		Choked discs	One 6th paralyzed		Tumor in corp. quad and optic thal.	Vertigo, ringing in ears, ataxia	
Lichtheim 1892 Case 3	Upward		Optic neuritis	Left 6 paralyzed		Caseous tumor in corp. quad.	Headache, diarrhea, vomiting, weakness of r. side of body	

TABLE SHOWING CASES OF PARALYSIS OF ASSOCIATED UPWARD OR DOWNWARD MOVEMENT.

Parinaud 1892	Upward	Normal size Reaction to light and con. normal	No lesion	Lateral movements imperfect. Downward good		Normal	No necropsy	Paralysis of left face and left upper limb (of short duration) Partial l. homonymous hemianopsia
Verrey 1893	Upward and downward						Recovery	Tendency to go to the left
Sharkey 1894	Upward, downward defective	Reaction to light preserved, and accom. but sluggish	Optic neuritis	Lat. movements good		Converg. defective	Tumor of corp. quad and cerebral ped.	Right deafness, numbness r. half body, r. hemianopsia, sensation r. half body disturbed, speech thick, nystagmus, loss of power r. side
Sauvineau 1894	Upward, downward feeble	Pupils equal, of normal size Reaction in accom. normal L. reflex affected	No fundus changes	Lat. normal, but nystagmus	No ptosis	Conv. lost	No necropsy	Apoplectic attack, transitory r. hemiparesis, diplopia
Schroeder 1894 Cited by Bach and Teillais	Downward							Fever, headache, vomiting, convulsions, at first complete ophthalmoplegia Attempt to look downward caused spasm of elevators

Bruner 1895	Upward			Lat. and downward normal				R. hemiparesis, impaired vision, slight nystagmus attempting to look upward
Hoesslin 1896	Upward	Pupils much dilated	Choked discs	Lat. and downward good			Sarcoma growing fr. pineal gland and corp. quad.	Increased thirst, polyuria, headache, vomiting, ataxia, loss of power in lower limbs
Mills 1898	Upward	Pupils equal, reacted to light and accom, but sluggishly	Fundus normal				No necropsy	Slight difficulty in speaking, tongue protruded to left, weakness of legs
Nothnagel Cited by Bach	Upward and outward				Bilat. ptosis		Tumor of 3d ven. aque. displaced. Pressure prob. on 3d neuclei	
Basevi Cited by Bach 1899	Downward					Con. affected	Lesion of corp. quad.	
Teillais 1899	Upward and downward	Reaction to light preserved	No fundus changes	Lat. normal	Ptosis 1 day	Con. lost	No necropsy	Apoplexy, unconsciousness, drowsiness, impaired intellect, dysarthria
Poulard 1901	Downward	Reaction to light normal		Upward and lat. normal L. int. rectus affected		Con. impaired	No necropsy	Apoplexy, diplopia

TABLE SHOWING CASES OF PARALYSIS OF ASSOCIATED UPWARD OR DOWNWARD MOVEMENT.

Gordinier 1901	Upward and downward	Internal ophthalmoplegia	Optic neuritis	Lat. normal	Double ptosis	Con. slight	Neuroglioma invading post. part. corp. quad. Aq. occluded	Headache, vomiting, dizziness, impaired mentality, cerebellar gait, tremor	Third nuclei distorted
Cruzon Babinski Marie Parinaud 1901	Downward							Apoplexy, delirium, slow speech	
Raymond and Cestan 1901	Upward and lat., both r. and l.	Pupils equal Reaction to light and accom. normal	Fundus normal	Downward almost normal	No ptosis	Con. little affected	No necropsy	Left sensori-motor hemiplegia, affected speech, diplopia, exag. tendon reflexes, Babinski	
Noguès Sirol 1901	Upward		Fundus normal	Downward and lat. normal		Con. normal		Insomnia, lassitude	
Kornilow 1903 Case 1	Upward and downward	Reaction to light and accom. slow		Lat normal		Con. impaired	Recovery	Weakness right 7 and 12, ataxia	
Kornilow 1903 Case 2	Upward and left lateral			Left eye turned inward, r. almost normal, down normal, but to left impaired	Bilat. ptosis	Con. normal		Paresis right 7, right upper and lower limbs, ataxia	
Posey Case 1 is given below by me as Case 4, Sherry									

Case 2 1904 Parkinson 1905	Upward movement Upward	Reaction slow Slow to light and accommodation	Fundus normal Discs pale but no optic neuritis	Good Lat. movements limited	None	Preserved		Apoplexy and right hemiplegia Ataxia, exaggerated reflexes, slight impairment of hearing in left ear, speech slow and hesitating	

ORIGINAL CASES

Case 1 Galik	Upward	Reaction good	Optic neuritis	Lat. movements impaired	None	Preserved	Tubercle on left side of pons	Right hemiplegia of limbs, left palsy of face, involvement of each ext. rectus and left palsy of masseter, exaggeration of right tendon reflexes, hearing affected on left side, left neuroparalytic keratitis	3d nuclei not involved
Case 2 Moore	Upward	Prompt in each eye		Nystagmus in lateral movements Paralysis of movement of both eyeballs to right and paresis of both to the left	Slight ptosis	Preserved but impaired	Glioma of right side of pons	Weakness of each 7, left paresis of tongue, right paralysis of muscles of mastication, paralysis of left limbs, bulbar speech	3d nucleus much degenerated
Case 3 F. D.	Upward downward and lateral	Reaction prompt to light		Inward deviation of right eye	None	Preserved tho' not normal	Hemorrhage in r. tegmentum of pons	Paralysis of r. side of face, of r. side of tongue and of r. muscles of mastication Paresis of left limbs	

TABLE SHOWING CASES OF PARALYSIS OF ASSOCIATED UPWARD OR DOWNWARD MOVEMENT.

Case 4 Sherry (Reported by Dr. Posey)	At first only upward, later also lateral movements and downward impaired	Reaction prompt to light	Normal, at least in early stage of disease	Later conjugate lateral movements much impaired	None	Lost	Living	Impaired mentality, ataxia of limbs, some exaggeration of tendon reflexes, tendency to fall backward when he sits down
Case 5 A. S. (Reported by Dr Zentmayer)	Upward	Right reaction to light good, left sluggish, also good in accom.	Incipient neuritis(?)	Good, but nystagmic	None	Weak	Recovery with paresis of only left superior rectus, later recovery of this muscle	Dizziness, headache, no ataxia, glycosuria
Case 6 S. H.	Upward	Reaction present not very prompt to light Pupils equal		No impairment	None	Preserved	Living	Impairment of hearing, some general weakness, ankle clonus on each side, especially on the right
Case 7 Roberts	Upward and downward		Choked discs	No impairment	No ptosis	Preserved		Headache
Case 8 Mrs. McM.	Upward	Reaction prompt		Left ext. rectus weak(?); no paralysis of associated lat. movement.	Bilateral	Lost	Recovery twice, with relapses	Convulsions, headache, nausea, vomiting, dizziness, ataxia
Case 9 W. B.	Upward and downward	Unequal, reaction feeble in right eye	Veiling of right disc	Nearly normal	None	Lost	Almost all the ocular movements were restored except the downward movement of right eye	Right hemiplegia, headache