the Bender Laboratory. I have examined 62 animals. Except for six pairs obtained from dealers in Pittsfield and Brookline, Mass., these animals were procured in the neighborhood of Albany, usually in small lots of one, two or three pairs, and in large part were animals which had been caught in the fall and domesticated but a short time. Of these, 51 may be considered presumably normal animals in that they had not been used previously for experiment of any kind, or were used only on the day of killing for blood pressure experiments or to obtain blood or fresh organs. They also represent animals which, in that they were used shortly after purchase, did not pass through a long laboratory life. They may be grouped roughly according to size into three groups of about equal number as large, small, and medium size. Vascular lesions were found in but three; these consisted, in each, of a few minute patches at the beginning of the aorta. All were large animals and presumably full grown.

Of the remaining eleven animals, one suffered from an abscess of the hip; three had received repeated injections of dog's serum; one, nephrotoxic serum; one, human blood; one, typhoid bacillus and three, chrome salts. These were all in the laboratory for several weeks or months. In this group lesions of the aorta occurred in four; in the animals receiving, respectively, injections of typhoid bacillus, dog serum, nephrotoxic serum and human blood. In two of these the lesions were diffuse involving irregularly the entire aorta and comparable to those produced by adrenalin. In the other pair a few small areas were present at the beginning of the aorta only.

This control study shows that spontaneous lesions were found in three of 51 presumably normal rabbits or in practically 6 per cent., or, if the animals used for various experimental purposes are included, in 7 of 62 animals or 11 per cent. This last view, however, is hardly fair, for as the lesions were present in four animals of the second group, or in 36 per cent., it cannot be denied that the experimental procedure may possibly have had some share in their production. Certainly the influence of typhoid toxin and alien sera can not be entirely set aside in view of our knowledge of the very general degenerative changes which these substances cause.

In this connection it may be mentioned that Israel⁴ in his study of the relation of heart hypertrophy to experimental nephritis has described and pictured a very diffuse lesion of the aorta in a rabbit receiving injections of alcohol directly into the kidney. This observation has been quite generally ignored in the recent literature of experimental arteriosclerosis; but Israel's illustration plainly pictures a lesion of the aorta not to be distinguished from that caused by adrenalin.

It would appear, therefore, that while spontaneous arterial degeneration may occur in the rabbit, it is not as constant a condition in all localities as the investigations of Miles and Johnstone indicate. Moreover, the figures here presented offer a satisfactory control of my earlier report on the general subject of experimental arteriosclerosis due to adrenalin and the later report in which I conclude that single doses of adrenalin may cause arterial lesions, a conclusion which might appear doubtful if viewed only in the light of the experiments of Miles and Johnstone.

In my opinion the occurrence of spontaneous lesions in the rabbit does not diminish the importance of the

lesions due to adrenalin, but on the contrary, increases their importance, as an example of a lesion occasionally occurring naturally, but which may readily be produced experimentally. The rabbit thus becomes a peculiarly valuable animal for the study of vascular lesions, for the interest of the adrenalin lesion lies not so much in its arteriosclerosis-like nature as in the opportunity offered for the study of degenerative and reparative lesions of arteries.

The possibility of a variety of factors operating to cause vascular injury is suggested by the four positive findings in the second group of 11 rabbits. The contrast with the first group is very striking and would indicate that a study of the arterial system of a large number of rabbits, kept under a variety of conditions, and subjected to various experimental procedures, would yield results of great value concerning chronic vascular lesions.

Finally it may be stated that the demonstration of these spontaneous lesions in no way vitiates the importance of the experimental lesions but does demand a very careful control study of the rabbits in each locality in which experiments are made.

THREE CASES OF CEREBELLAR TUMOR.

OPERATION IN TWO CASES; RECOVERY IN ONE.*

WHARTON SINKLER, M.D.

PHILADELPHIA.

The subject of tumors of the cerebellum has excited much interest during the past few years and the question as to the advisability of operation is still a mooted one. It seems desirable, therefore, to add to the literature all the cases possible, so as to throw more light on the subject, and this is my excuse for reporting at this time only three cases of cerebellar disease. These all, however, exhibit some interesting and instructive features.

Opinion varies widely as to the beneficial results of operation. For example, Sachs says that out of twenty-three of his patients, not one was cured. Operation was done in seven of these cases, but without recovery. Frazier, in 1904, collected reports of one hundred and sixteen cases of operation on the cerebellum, with recovery in 15 per cent. Starr, in 1903, gave as a result of operation in fifty-eight cases of tumors of the cerebellum, recovery in sixteen; that is, he states that the tumor was removed and the patient recovered.

It seems, therefore, as if there should be some more definite understanding as to the meaning of recovery. If an author means by recovery that the growth has been removed and the patient survives a few weeks, it is a very different thing from a case in which there has been no return of symptoms for two or three years; and one cannot help feeling that writers mean different things when they give such different results.

In the cases reported by me, one patient recovered from the operation, and when seen seven months later, he was apparently in perfect health. In this case, the growth was a cyst, the contents were evacuated and the wound closed. The patient when seen had no headache, his gait was normal and his mental operations were good. His vision, however, was practically lost. In the right eye he was totally blind, and in the left there was

* Read in the Section on Nervous and Mental Diseases of the American Medical Association, at the Fifty-ninth Annual Session, held at Chicago, June, 1908.

4. Virchows Archiv., 1881, lxxxvi, 299.

only sight enough to enable him to go about and read very large type. The vision in this case failed rapidly after the operation, although the swelling of both discs subsided very rapidly.

In the second case the patient had shown no signs of brain disease until nine weeks before she came under observation. Her symptoms progressed so rapidly and vision had begun to fail to such an extent that, although there were no definite localizing symptoms to indicate a point for trephining, it was thought advisable to do a decompressive operation. Dr. Mills saw the patient with me and on account of the nature of the symptoms thought it possible that the lesion might be located in the vermis; at any rate, it seemed as likely that the tumor was situated in one hemisphere as the other. There was paralysis of the sixth nerve on the right side and this fact made us select a point over the right hemisphere for making the first trephining. No growth was found at operation, but at the autopsy which was made thirteen days later, a tuberculous tumor was found in the anterior part of the right hemisphere of the cerebellum, infringing on the medulla and making a marked depression in its right side. In the left hemisphere were two smaller tumors. The fact of there being a growth in each hemisphere would account for the bilateral symptoms presented by the patient during life. In walking, she would sometimes pitch to one side and sometimes to the other. In this case, although the swelling of the discs subsided in a remarkable manner after the operation, the vision continued to fail.

These two cases teach us that in order to save vision an operation must be done at an early date.

A point of interest in the third case is that sudden death occurred while the patient was in fairly good condition. Sudden death in brain tumor is not unusual. I have seen two or three instances of this myself. A lesson to be learned from this case is that, had an early operation been done, the patient would probably have been cured of his trouble because the tumor was found postmortem to be one which could have been readily removed. This is another example of the importance of early operations in tumors of the cerebellum. If one comes to the conclusion that an operation must be performed, it is worse than useless to delay to try the effect of drugs, or for any other reason. In the words of Macbeth: "If it were done when 'tis done, then 'twere well it were done quickly."

CASE 1.—Patient.—G. H., was seen in consultation with Dr. Louis Jurist on Sept. 15, 1907. The boy was 10 years old. The parents were both healthy and two brothers and two sisters were healthy. The father admitted that he had a specific urethritis, but denied any history of syphilis in himself or family.

History.—Fourteen months previously, in July, 1906, the boy was hit in the eye with a wooden peg. He became sick at his stomach, vomited and had severe headache for some time afterward. There was no further trouble after this. One year ago he began to complain of pain in the occipital region. This constantly grew worse, and in June, 1907, he would often vomit during the severe headaches. These violent attacks usually occurred in the early morning. Five weeks ago he had severe headache and vomiting, which lasted for three days. The eyes were examined by Dr. Schneideman, who found that both optic discs were very much swollen. The patient was admitted to the Orthopedic Hospital and Infirmary for Nervous Diseases, Sept. 28, 1907.

Examination.—The patient was found to be a well-nourished boy, but of pale color. In walking there was distinct incoordination and a tendency to pitch toward the left side. There was no loss of power in either arm or leg. When the mouth was opened it was drawn slightly to the right. The tongue

was protruded straight. The pupils were large and equal. The vision was very poor. The knee-jerks were normal and equal. The plantar reflex was normal; there was no Babinski phenomenon or ankle clonus. The heart and lungs were normal. The tongue was coated, but the patient's appetite was good and the digestion seemed fair. The conspicuous symptom was pain in the head. This was quite violent and was referred to the occiput. There was more or less pain all the time, but there were attacks of severe headache with vomiting. There was no tenderness over any part of the scalp.

After admission to the hospital the pain in the head lessened in severity, and it was not until October 5 that the boy had a severe headache. After this time the headaches increased in frequency, and the boy's walking became worse; he staggered considerably, deviating to the left. The station was poor and he was unable to stand with the eyes closed.

Diagnosis.—Dr. Charles K. Mills kindly saw the patient in consultation and agreed with me that the case was one of tumor of the cerebellum, and that it was probably in the left hemisphere. Dr. W. J. Taylor was asked to see the patient with a view to operation, and after consultation it was decided to open the skull and attempt to remove the growth.

First Operation.—The following notes have been furnished by Dr. W. J. Taylor: Oct. 12, 1907. Ether was given as an anesthetic and a curved incision made over the cerebellum on the left side. The skin and soft tissues down to the bone were deflected, and there was now tremendous hemorrhage, probably from the veins leading from the bone to the scalp. The patient's prostration was out of all proportion to the amount of blood lost. The hemorrhage from several of these sinuses, or veins could be controlled only by plugging the opening in the bone with bits of sterile wood, and Horsley's way was used freely all over the surface of the bone. With the chisel a small opening was made in the skull and then enlarged to about an inch and a half in diameter with the rongeur forceps. The patient's condition was now so alarming that it was deemed best to pack the wound and wait for him to recover from the shock. The dura, therefore, was not opened, although it was very tense and bulging. The patient's general condition was so bad that intravenous saline injections were given and a variety of stimulants employed hypodermically.

In spite of the great loss of blood and the shock, he recovered very satisfactorily from the effects of the operation. At Dr. Sinkler's suggestion, it was decided to wait before doing anything further to see if this decompression would relieve the patient's symptoms. He was very much relieved of his headache, but by November 2 the headache had returned, there was cerebral vomiting, and his condition was steadily growing worse.

Second Operation.—He was therefore again given ether and the flap of the skin over the former wound was carefully dissected away from the dura. The dura bulged very much more than at the first operation, and there was little or no hemorrhage from the scalp. The dura was incised by a curved incision, and immediately the cerebellum tissues pushed out through the slit that was made. This was rapidly enlarged, and the brain bulged at least one inch above the surrounding dura. While dissecting off the dura—for it was adherent at one or two points where it had to be stripped off with the finger—there was noticed a slight difference in appearance of the surface of one of the convolutions near the mastoid side of the wound. This change was so peculiar in its character that I had just said that here undoubtedly was a tumor, when a cyst gave way and a spurt of serous fluid was ejected with such force that it went three feet away from the wound. The column of the fluid was nearly the size of a pencil. Of course, it was impossible to collect any of this fluid for examination, but its consistence and appearance was that of an ordinary pleuritic effusion. Immediately the cerebellum collapsed, and instead of there being a protrusion there was a depression in the wound. The opening in the cyst was then slightly enlarged, and it could be seen that there was a thin-walled cyst, the wall of which could not be dissected out. There was no evidence of malignancy or induration about it. A small drain of iodoform gauze was carried down to and into the opening of the cyst and the dura was closed over it.

Later History.—The patient made an absolutely uninterrupted recovery; indeed, by the next morning he said that he felt perfectly well. All of his pain was gone and he did not vomit once, even from the ether. In three or four weeks he was walking about and feeling as well as usual. Seven months later he was in good health, but had been admitted to an asylum for the blind.

Eye Examination and History.—Oct. 1, 1907, the vision of the right eye was 6/0 —; of the left eye 6/6—. The pupils measured 4.5 cm. and reacted normally to light, forced convergence and accommodation. Ophthalmoscopic examination revealed pronounced choked discs, the height of the swelling being between 6 and 7 D. At the lower edge of the swollen disc of the left eye there was a large retinal hemorrhage. No macular changes were noted in either eye. The visual fields were concentrically contracted for form and colors. These examinations were made by Dr. Holloway, and seven days later repeated by Dr. de Schweinitz, who found an increase in the swelling of the right optic disc, the height of which was now 8 D., while the left optic disc remained about the same, namely, 7 D.; no change in the other ocular conditions previously noted, and no palsy of any exterior ocular muscle. Convergence, however, was poor, the left internus being the weaker.

The next ocular examination was made Oct. 18, 1907, or six days after the first operation, at which there had been excessive hemorrhage. At this examination Dr. Holloway found the height of the swollen disc of the right eye to be 7 D., and therefore slightly less swollen than it was on October 8. An added ophthalmoscopic appearance was the formation of a complete stellate figure in the macula, composed of milky-white striae, at the outer limits of which were several small hemorrhages, and adjacent to them a thin, diffuse hemorrhage. There was also one fresh hemorrhage on the temporal side of the swollen disc. The height of the swollen disc of the left eye was 7 D., and in the macula a number of fine, yellowish-white dots had formed, which were associated with several punctate hemorrhages. Seven days later there were practically no ophthalmoscopic changes, except that in the left eye the previously fine punctate spots had begun to form by coalescence a stellate figure.

November 2, three days after the second operation, Dr. de Schweinitz found a notable diminution in the swelling of each optic disc, that on the right side being reduced to between 3 and 4 D. in height, therefore a lessening of practically 4 D., while on the left side the disc measured between 5 and 6 D., or from 1 to 2 D. less than it had been prior to the second operation. There was marked depreciation of central vision of each eye. Again, five days later there was still further reduction of the visual acuity, so that now the right eye had only doubtful light perception, while in the left eye the vision was reduced to 4/20 and one letter of 4/15. There was still further reduction in the height of the swollen discs, which now on the right side measured about 3 D. and on the left side between 4 and 5 D.

At the next examination, on November 15, the right eye was found to be entirely blind and the vision of the left eye 5/15—. There was no light reflex of the right pupil, but the left pupil responded promptly to light. The conditions of the discs were about the same as at the last examination, and continued so, with gradual loss of vascularity and reduction in the height of the swelling, until December 6, when the vision of the right eye was, as before, entirely obliterated, and of the left eye about 6/30.

The evidence of marked postpapillitic atrophy, most pronounced on the right side, were clear, and the swelling of the discs had almost disappeared.

On Jan. 10, 1908, the right eye was entirely blind and the left eye had a vision of 6/60. There was pronounced post-papillitic atrophy on both sides.

This condition of affairs had continued until the present time, and at the last examination, on March 27, 1908, both discs now being flat and showing well-marked atrophy, the visual field of the left eye was reduced in size and color perception practically lacking. The vision of 6/60 was still retained.

Exactly how soon after the first operation the depreciation of central visual acuity began can not be stated, owing to the

fact that the boy's condition was such that no accurate tests could be made. In spite of the rapid reduction in the swelling which took place after the second operation and the evacuation of the cerebellar cyst, atrophy of the optic nerve on each side rapidly supervened. This unfortunate result in an otherwise brilliant case from the surgical standpoint has been noted in other instances in which there has been excessive hemorrhage, and it is not improbable that to such excessive hemorrhage this atrophy should be attributed, owing to a rapid deterioration of the ganglion cells. In any event, if the vision of 6/60 is retained, which now seems likely, the operation saved the boy from total blindness, which otherwise must certainly have taken place.

CASE 2.—Patient.—M. K., aged 16, a girl, had been employed in an overall factory for seven months and was admitted to the Philadelphia Orthopedic Hospital and Infirmary for Nervous Diseases, April 21, 1908. Her family history was negative, as far as could be ascertained.

History.—She seemed to have enjoyed good health; there was no history of injury. The present condition developed about nine weeks previous to admission, with violent, persistent pain in the head, projectile vomiting after taking food, unsteadiness of gait and double vision. She had grown steadily worse.

Examination.—She was found to be a thin, poorly nourished girl, quite tall and slender. There was an internal strabismus of the right eye, the result of paralysis of the right externus; and she kept the right eye closed much of the time in order to secure single vision. The resident physician thought that there was ptosis of the right lid, but this was uncertain. At any rate, in the course of three or four days whatever ptosis there had been had entirely disappeared. The thyroid gland was somewhat enlarged, especially the right lobe. The heart's action was rapid, but there was no murmur. There was distinct impairment of resonance at the right apex. Examination of the abdomen was negative. The patient's walk was very unsteady. Sometimes she pitched to the right side and sometimes to the left, and often would fall if not supported. In standing her station was bad, with the eyes open or shut. It was a little worse with the eyes open, but did not grow decidedly worse after long standing. There was a distinct tendency to sway backward while standing, and the patient often had to be held to keep from falling. There was no change in sensation in any part of the body, and no paralysis in any muscle or group of muscles. There was a lack of facial expression, but the movements of the face were equal on both sides. The knee-jerks were completely absent; the plantar reflex was present. The patient had no cough and had a fairly good appetite. She was ordered rest in bed, soft diet, potassium iodid 10 gr. three times a day, the dose to be increased one grain three times a day; inunction of mercurial ointment daily.

Eye Examination.—The examination of the eyes was made by Dr. Holloway on April 24. He made the following report: "O. D., 6/6; O. S., 6/6; pupils equal—larger than average. They react to light and to indirect accommodation and convergence. Media are clear. The patient has a bilateral optic neuritis, more extensive on the right side. The veins are much fuller on the right. There is no exudate in the macular region and there are no pronounced hemorrhages. The height of the right disc is 4 — 4½ D.; left disc 3½ — 4 D.; fundus, 1 — D. The patient has a paresis of the right external rectus. On rotation of the eyes to the left, the left eye attains full limits, but excursion is not well maintained. On rotation to the right, the right eye goes to within ¼ inch of the left canthus. There is a slight convergent squint in the left eye. On lateral rotation there are nystagmoid movements at the outer limit, slight when rotated toward the right, more pronounced when rotated toward the left: no nystagmoid movements on vertical rotation." Four days later, April 28, Dr. de Schweinitz made an examination of the eyes and reported: "Right eye vision, 6/9 — 6/6; left eye vision, 6/6 — 6/6. Right eye, optic neuritis, surface + 4 diopters. Veins very full and uneven. Full vascularity of discs. Left eye beginning neuritis; surface + 2 diopters. Veins not large. Center of disc not filled in." The patient seemed to improve somewhat for several days. The vomiting ceased and also the

pain in the head. This was probably due to the fact that she was kept extremely quiet. On May 1, Dr. Holloway made another examination of the eyes and found the fields distinctly contracted. Vision, right eye, 6/9 and four letters on 6/6. Vision, left eye, 6/9, and one letter on 6/6. Height of disc about the same, but process in the left eye seemed more pronounced.

The patient's symptoms all seemed to be growing worse. There was return of vomiting and some pain in the head and vision was failing distinctly. I asked Dr. Charles K. Mills to see the patient with me and he agreed fully in the diagnosis of the cerebellar tumor. There were no positive localizing symptoms, but we decided that in order to save the vision, if possible, a decompressive operation should be performed.

Operation.—In view of the fact that the sixth nerve palsy was on the right side, we thought best to trephine first over the right hemisphere. Dr. G. G. Davis performed the operation. An opening $1\frac{1}{2}$ inches in diameter was made in the skull and the dura was opened. The cerebellum showed more than normal tension and it was softer than usual. An exploratory puncture was made with a probe in two directions, but no fluid was obtained and no sense of either growth or cyst was felt. There was considerable amount of hemorrhage, but not excessive. The patient was under the anesthetic for two hours and a quarter.

Postoperative History.—The patient made a good recovery from the anesthetic and seemed in good condition the next day. There was no change in vision, although it could not be carefully tested. On May 8, three days after the operation, Dr. Holloway made an examination of the eyes and found vision O. D. 6/15 and two letters on 6/12; O. S. 6/9 and two letters on 6/6; no free hemorrhages and no reduction in the swelling of the discs. On May 12, seven days after the operation, Dr. de Schweinitz made an examination of the eyes and reported: "Right eye, apex of disc not more than + 2 D.; edges still veiled but visible. Left eye, all edges clear and surface of disc not more than 1 D. Outer half shows beginning atrophy and change. Vision 6/60 in each eye." The patient maintained that she could see no more. Dr. de Schweinitz said: "There has been an astonishing subsidence of the choked disc. In point of fact, it has nearly disappeared on left side and only about a diopter and a half remains on the right side. I am sorry to say, however, that direct vision has materially depreciated, so that now there is only about 6/60 or 1/10 of normal vision as compared with 2/3 before the operation. I hope that this is more apparent than real, and that the patient's very depressed condition may have accounted for some of her inability to read letters." The patient grew rapidly worse from this time. On May 15 her temperature varied from 100 to 102; respiration was 30 to 40. Her mind was cloudy; there was twitching of hands and arms, but more continuous twitching on the left side. There was some hypostatic congestion of the lungs, which had been steadily increasing. May 17 patient died, twelve days after the operation.

Autopsy.—This was made by Dr. H. B. Wilmer, the resident physician, who kindly gave me the notes. There was absence of rigor mortis; considerable wasting of the muscles; slight distention of the abdomen. The skullcap was removed in the usual manner; the dura seemed slightly thickened, with marked congestion of the vessels. The brain substance seemed of normal consistency. On inspection of the base of the brain there was seen a dense grayish membrane covering the base and extending up the sides of the cerebellum. There also seemed an increase in the amount of cerebrospinal fluid. This was not measured, as a great deal was lost in the process of removing the brain from the cranial cavity. All the nerve tracts at the base of the brain were intact. The vessels of the cortex were markedly congested and stood out prominently. Apart from this the gross appearance of the cortex was normal. The pia at base of the brain and over the anterior surface of the pons, extending to the optic chiasm was somewhat milky in appearance. About the optic chiasm there was a moderate amount of yellowish-gray fibrous exudate. The sixth nerves did not appear abnormal at exit. The cerebellum showed on exterior of the right side the site of operation. There was a cavity with ragged edges large enough to insert the end of the little finger, with some blood clots around the edges. On cross-section on the left

side in about the central portion of the hemisphere were seen two rounded gray masses, well defined and quite different from the surrounding brain tissue. The anterior tumor was separated from the second by normal brain tissue and was 15 mm. in diameter and 5 mm. in depth. The posterior tumor was larger, being 8 mm. in diameter and 8 mm. in depth. In the cerebellar substance of the right hemisphere another tumor was found, 18 mm. in diameter and 12 mm. in depth, bordering on the median line and extending forward so as to cause marked pressure on the medulla, where there was observed a small depression just above the decussation of the pyramids. The growth did not extend outside the cerebellar substance. On microscopic examination the growths were found to be tuberculous. At the right apex there was found tuberculous consolidation and a considerable amount of cheesy matter could be expressed from the lung tissue.

CASE 3.—Patient.—P. H., aged 26, married, was seen in consultation with Dr. William Turner VanPelt at the Episcopal Hospital, March 29, 1905. He had previously been under the care of Dr. Burton Chance, who has reported the case at length from the ophthalmologic point of view.¹

History.—When about 15 years of age the patient had an attack of insolation, from which he recovered without ill effects. He was a printer of cotton stuffs. He denied venereal disease and stated that he had always been temperate. About Easter, 1904, he was suddenly seized with a violent attack of headache, which lasted four days. In July he sailed for England, his native country. During the voyage he had violent vomiting, which was supposed to be due to seasickness. After landing, however, he had severe headaches and violent attacks of vomiting which were projectile in character. Then for a considerable period he had headaches on alternate days, the attacks usually occurring after awakening in the morning. After September 1 the attacks were infrequent. He returned home in October, and during the voyage he was very sick and had violent spells of vomiting. After landing he suffered intensely with pains in the head in the occipital and frontal regions. About the middle of November the right side of the face became crooked and continued so for about a week. About this time it was noticed that the external rectus of the left eye was paralyzed, and a day or two later diplopia set in. This was followed by dimness of vision and photophobia. Except on the days of the headaches, when the arms and legs felt numb, he was able to take the usual amount of exercise. The headaches gradually subsided and he felt quite well. On Dec. 22, 1904, the patient was first seen by Dr. Chance. At that time there was nothing remarkable in gait or station. The tendon reflexes were apparently undisturbed. Mental condition was clear. The patient's chief complaints were referred to the eyes. The acuity of vision of the right eye was reduced to 6/15 and the left eye to 6/22.5. The accommodation power was abolished. The optic axes were markedly convergent; the left external rectus failed to effect parallelism. There was no nystagmus. The optic discs were swollen to + 5 D. The retina was everywhere edematous. The arteries were constricted and reduced to threads, while the veins were great broad tortuous currents. On the swollen nerve head were several flame-shaped hemorrhage extravasations. The patient was admitted on December 27 to the Germantown Hospital. He was confined to bed and a course of alteratives, diaphoretics and salines was instituted. At the end of ten days the diplopia disappeared and the edema of the retina and venous engorgement became remarkably reduced. At no time was there vomiting, headache, disturbance of locomotion, or change in station. The acuity of vision remained unchanged and the optic papillae remained as prominent as at the earlier examinations. The patient was discharged from the hospital on January 23 and remained in fairly good condition until February 26, when he suffered from intense right-sided headaches. Two days later there was convulsive seizures involving the arms, with stiffness in the back of the neck, occipital pains with vomiting. The patient was admitted to the Episcopal Hospital on March 2, 1905.

Examination.—He was found to be weak and debilitated, but without any actual loss of power in the extremities. The blood

1. Tr. Coll. Phys., Philadelphia, 1905.

count was perfectly normal. There was no albumin or sugar in the urine. The vision of the right eye wa. 20/70; left eye, 20/200. The posterior rotation of the left eye was somewhat impaired by the paresis of the external rectus. All movements of right eye showed no impairment of the extraocular muscles. In neither eye were there nystagmoid movements. The pupils reacted normally to light, convergence and consensually. The fields of vision were contracted. The ophthalmologic examination showed great swelling of the retina, the projection of the optic discs to 6 D. splotches of degeneration and small linear hemorrhages and enlargement of the optic disc. There was spasticity of the muscles of the neck with retraction of the head.

Course of Disease.—Mercurial inunctions were ordered daily and light diet only was allowed. At once marked improvement in the health took place and continued for ten days. There were no attacks of vomiting and he was greatly relieved of the headache. After two weeks the diet was enlarged and potassium iodid in increasing doses was prescribed. After this time there was a return of the headaches, with much violence. The pain was usually located in the occiput, rotating to the left frontal region. The head was retracted. Vomiting was frequent. When seen by me the patient complained of violent pain in the occiput; there was stiffness of the muscles of the neck, with a tendency to retraction of the head. The patient could walk unassisted, but the gait was very unsteady and he staggered with a distinct tendency to fall to the left side. The patella reflexes were abolished. A diagnosis of tumor of the cerebellum, probably on the left side, was made, and an opera-

Fig. 1. Case 2.—Showing two tuberculous tumors in left hemisphere of cerebellum and one in right. A indicates tumors.

tion was urgently advised. However, it was deemed wise to continue medical treatment for a few days longer, and the operation was therefore postponed. On April 7, while in fairly good condition, the patient was seized with violent delirium, from which he fell into a comatose state and died suddenly four hours later.

Autopsy.—A tumor was found situated in the outer portion of the left lobe of the cerebellum, to which it was loosely attached. It was not at all infiltrating, but had made a depression in the left cerebellar lobe 2.5 cm. in depth. The tumor was very firm, almost globular, with a somewhat irregular surface, and did not appear to have been adherent to the dura. It was 0.4 cm. in width and 5.5 cm. in thickness from above downward. When cut it appeared friable and resembled a fibrosarcoma. It had caused some pressure on the fourth ventricle and thereby moderate internal hydrocephalus of the cerebrum, although the aqueduct of Sylvius was not much dilated and the fourth ventricle not at all. The third and lateral ventricles of the brain were moderately distended, especially the posterior horn of the left lateral ventricle, the floor of which was forced upward by the pressure of the tumor on the under surface of the left occipital lobe. None of the cranial nerves were implicated in the tumor. The microscopic examination showed that the tumor was a fibrosarcoma. This report was made by Dr. W. G. Spiller, who remarked that he had "never seen a tumor of the cerebellum which offered more favorable conditions for operation than did this tumor,

situated as it was on the lateral portion of the left cerebellar lobe and not infiltrating the cerebellum in the least."

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DISCUSSION.

DR. CHARLES K. MILLS, Philadelphia: I saw one of these cases with Dr. Sinkler. It is quite an interesting point in symptomatology that this patient who had on each side of his brain in each lateral lobe of the cerebellum, a small tumor, did not present the laterality so often observed in lateral lobe growths, nor did he present the peculiar compensatory attitude of the head or body which is observed in these unilateral cerebellar growths. This record is a small but important addition to our knowledge of the symptomatology of bilateral lesions of the cerebellum. The growth on one side seemed to compensate for that on the other in the production of the symptomatology, at least so far as any trending to one side or any one-sided attitude was concerned.

DR. JOHN J. THOMAS, Boston: I saw a number of years ago a case in which operation had been refused, and in which on autopsy we found a tumor on each side of the brain at the cerebellar-pontile angle; and there the unilateral symptoms pointing to one side seemed to be counteracted by the presence of another tumor on the opposite side. My own experience lately has confirmed what Dr. Mills and Dr. Sinkler have said, that if we are going to have any effect on the vision from operation, it must be done very early.

DR. ARCHIBALD CHURCH, Chicago: Out of seven of my cases in which operations have been done, four patients have made what might be called perfect recovery. In the first case in which Dr. McArthur operated for me, and which was seen by Dr. Jones in St. Luke's Hospital just after the operation, we found a hemorrhagic cyst, and there was a clear history of cerebellar hemorrhage. This patient recovered and worked as a laborer practically for years, but has disappeared. I did not favor operation in the second case. The patient was afterward operated on in St. Louis by Dr. Mudd under the direction of Dr. Fry. The tumor was removed and the man lived over two years. During much of this time he served as proprietor and editor of a newspaper. The third patient came to me from Wisconsin, a clergyman, who presented symptoms of cerebellar tumor. Dr. Brower and Dr. Bassoe confirmed my diagnosis. The patient was operated on by Dr. Bevan, who found a large tumor of the cerebellum, but did not remove it. A couple of weeks later, on my urging him to do so, he reopened the wound and removed the tumor. The man has been conducting the services of a country parish ever since. The fourth case was that of a boy who received an injury on the head by swinging against the corner of a house in a rope swing, striking the back of his head. Some weeks afterward he complained of headache. When he came to me he had double choked disc and other manifestations of cerebellar tumor. An operation was done by Dr. Van Hook, an apparently gliomatous cyst being uncovered and scraped out. Unfortunately, the scrapings were lost, so that the confirmation of the pathologic condition was not made. The boy is still alive, entirely blind, but with no recurrence.

The other three patients died directly. But four recoveries out of seven give one reason to hope that the prognosis is not so bad in properly selected cases when operation is done early, as the larger statistics might indicate.

DR. JULIUS GRINKER, Chicago: I had an experience with a cerebellar tumor which I think is unique. A patient had been complaining of nervous symptoms for a year, had been sent from one physician to another, had been examined for ophthalmoscopic findings, and no abnormalities had been found. Her last physician was an ophthalmologist, who found the eyegrounds normal. He referred the patient to me. She was considered hysterical. When she first came to me I found no symptoms of tumor. She had been visiting me for a period of four weeks, when one day she entered my office presenting the typical cerebellar gait, complaining of vertigo and nausea; she barely opened the door, when she staggered and almost fell to the floor. She said: "I am so dizzy; I just got dizzy crossing the street-car tracks." I examined her fundus and found a typical choked disc. My diagnosis was cerebellar tumor. Two weeks later she was operated on, when a large irremovable cerebellar tumor was found. The patient did not

recover. Here was a patient who probably suffered from cerebellar tumor for over a year without discoverable symptoms.

Another interesting case that I might mention here is one of a tumor at the cerebello-pontile angle, diagnosed as a case of neurasthenia by a very good neurologist, until his brother, also a doctor, brought the patient to me and told me that he suspected tumor. At that time some new symptoms had developed, deafness, tinnitus aurium, difficulty in vision, patient almost blind, and I diagnosed it as a case of tumor in the left cerebello-pontile angle. Several surgeons tried to find it, but did not succeed. The patient was taken to Baltimore and Dr. Harvey Cushing found a small fibroma in the left cerebello-pontile angle. In the meantime, the boy had become blind. This case emphasizes the importance of diagnosing and localizing tumor when blindness is not complete; when the latter has occurred operation can not preserve vision. The boy made a perfect recovery, but his vision will never return. How different the result might have been if operation had been performed before blindness had occurred!

THE MEATO-MASTOID OPERATION IN CHRONIC MASTOIDITIS.

THE TECHNIC, RATIONALE AND INDICATIONS.*

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To Heath belongs the credit of attracting wide attention to a mode of operative technic which promises to supplant the radical operation in a considerable number of cases. The operations devised by Wolfe, Stacke, Körner and Heath are not identical, though they are in general similar.

I have called the operation as performed by me, the meato-mastoid operation, as it consists (a) in the removal of the posterior wall of the bony meatus as deep as the annulus tympanicus, and (b) the complete exenteration of the mastoid cells. The remnants of the membrana tympani and the ossicles are not disturbed (Fig. 1).

The technic is indicated in column two of the Comparative Table of Technic.

SPECIAL POINTS OF TECHNIC WHICH LARGELY INFLUENCE THE SUCCESS OF THE MEATO-MASTOID OPERATION.

The points to which attention is called, are: (1) The complete exenteration of the pneumatic cells in the temporal bone. (2) Shall the walls of the bony wound be left rough, or shall they be made smooth? (3) The plastic meatal skin flaps. (4) The drainage dressing.

(1) *The Exenteration of the Pneumatic Cells of the Temporal Bone.*—I have more than once heard the statement that no operator can positively say that he has removed all the pneumatic spaces of the temporal bone. While this is perhaps literally true, practically it is not. In exceptional cases the cells are distributed over such a large area as almost to include the lateral half of the skull. A specimen in the possession of Dr. Ernest de Wolfe Wales presents the remarkable phenomenon of the apparent communication of the mastoid cells with the sphenoidal cells via the base of the skull, below and posterior to the petrous pyramid of the temporal bone. In such a case it would perhaps be impossible to exenterate all the pneumatic cells. The surgeon may know,

however, when he has removed all the cells in the mastoid process, the zygomatic root and the squamous plate. It is somewhat more difficult to locate the cells when they are anterior to the meatus. In such cases they are usually also present in the zygomatic root, and if the zygomatic cells are carefully exposed in a forward direction those in the region anterior and superior to the bony meatus will be exposed to view and exenteration.

Having suggested the possible anatomic distribution of the cells, the question of the necessity for their complete removal remains to be discussed. The chief object of their removal is to establish free drainage and ventilation. If these purposes can be accomplished without a complete exenteration, the tissues may gradually assume their normal condition and a cure result. Unfortunately the ostia between the cells are often small and may prevent such a happy result.

In the first place, the channels or ostia of communication between the cells are often so small that the least swelling of the mucous membrane completely blocks them. In the second place the remote cells are often the seat of infective granulation tissue which still further obstructs

Fig. 1.—The complete exenteration of the mastoid cells. In the meato-mastoid operation the posterior wall of the meatus should be removed down to the annulus tympanicus as shown by the dotted lines.

the drainage and ventilation. If the cells are not fully exposed and exenterated they will continue to discharge purulent secretions into the mastoid wound for an indefinite period. I recall a few cases in which such a discharge persisted from beneath the upper plastic meatal skin flap and have no doubt that it came from the zygomatic cells.

(2) *Shall the Walls of the Bony Wound Be Left Rough or Shall They Be Made Smooth?*—Another reason for the complete exenteration of the mastoid cells is that in many of the cases of chronic mastoiditis the bone is dense and sclerosed, and the nutrient blood vessels are small. The vitality is low and the process of regeneration by granulation tissue is imperfectly performed. The low vitality predisposes the new granulation tissue to infection, and exuberant granulations. It becomes necessary, therefore, to adopt measures that will provide better nutrition to the granulation tissue. The most feasible way is to reflect the plastic meatal skin

* Read in the Section on Laryngology and Otology of the American Medical Association, at the Fifty-ninth Annual Session, held at Chicago, June, 1908. The article is here abbreviated by the omission of the comparative table of technic and part of the pictures. The complete article appears in the Transactions of the Section