Staff Meeting Bulletin
Hospitals of the » » »
University of Minnesota

Encephalo-Myelo-Radiculitis

Volume XII | Friday, December 6, 1940 | Number 8

STAFF MEETING BULLETIN
HOSPITALS OF THE . . .
UNIVERSITY OF MINNESOTA

Volume XII | Friday, December 6, 1940 | Number 8

INDEX

Published for the General Staff Meeting each week during the school year, October to May, inclusive.

Financed by the Citizens Aid Society.

William A. O'Brien, M.D.

I. LAST WEEK

Date: November 15, 1940

Place: Recreation Room
Powell Hall

Time: 12:15 - 1:32

Program: Movie: "Underground Farmers"

Immunization of College Students
R. V. Ellis
Ruth E. Boynton

Present: 151

- - -

Date: November 22, 1940

Place: Recreation Room
Powell Hall

Time: 12:15 - 1:25

Program: Movie: "Donald's Dog Laundry"

Lung Cysts
Leo G. Rigler

Present: 150

Abstract will be published at a later date.

- - -

Date: November 29, 1940

Place: Recreation Room
Powell Hall

Time: 12:15 - 1:15

Program: 1940 Football Movies

Narrator: Sheldon Beise

Present: 187

- - -

II. MOVIE

Title: "Profit Without Honor

Released by: University of Minnesota

III. ANNOUNCEMENTS

1. The STAFF MEETING ASSIGNMENTS for the remainder of the year are as follows:

December	13	Urology
	20	Bacteriology
	27	Holiday
January	3	Holiday
	10	Surgery
	17	Obstetrics and Gynecology
	24	Internal Medicine
	31	Ophthalmology
February	7	Dermatology
	14	Pediatrics
	21	Orthopedic Surgery
	28	Neurosurgery
March	7	Radiology
	14	Surgery
	21	Out-Patient Medicine
	28	Holiday
April	4	Internal Medicine
	11	Holiday
	18	Student Health Service
	25	Radiation Therapy
May	2	Pediatrics
	9	Obstetrics and Gynecology
	16	Physical Therapy
	23	Laboratory Service
	30	Holiday
June	6	Anesthesiology
	13	Administration

- - -

2. HIBERNIANIANA

A. Dr. and Mrs. Douglas P. Head - Twin daughters, Mary Elizabeth and Margaret Jean - October 28.
Score - 5

B. Dr. and Mrs. Charles E. Rea - a daughter - Mary Virginia Rea - November 20.
Score - 2

C. Dr. and Mrs. William A. O'Brien - a son, Michael - December 1.
Score - 5

- - -

IV. ENCEPHALO-MYELO-RADICULITIS

(Acute febrile polyneuritis, facial diplegia with polyneuritis, radiculoneuritis, acute infective polyneuritis, myeloradiculoneuritis, myeloradiculitis, Guillain-Barre' syndrome)

Charles G. Polan
A. B. Baker

Introductory Comment

In the following discussion we do not intend to infer that this symptom-complex is a specific disease entity, even though some investigators believe that this is actually the case. Since no specific etiological agents have been isolated in the reported cases, it may very well be that we are dealing only with certain variants of already well-known neurological disorders. However, since there have been many reports in the recent literature describing this symptom-complex as a disease entity and since many of the reported clinical features do present some unusual characteristics, we feel that a review of this subject and a report of eight similar cases may be of definite value.

History

This symptom-complex was probably first described by Osler in 1892 under the title of "acute febrile polyneuritis." Since that time numerous variations of this syndrome have been published under a great variety of names, indicating how variable and widespread the infection may be. Only a brief review of the literature will be undertaken at present in order to show the general trend of thought concerning this symptom-complex.

Patrick in 1916 reported a group of cases in which a facial diplegia was associated with the polyneuritis.

Guillain, Barre' and Strohl and Guillain, in 1916 and in 1936 recorded a total of twelve cases in which the neurological findings were primarily those of a neuronitis. These patients all had a flaccid paralysis. There appeared to be some involvement of the deep sensation with much less impairment of the superficial sensation. The ages of the patients varied between 20 and 40 years. In many cases there was a slight but transient facial paralysis. In all the spinal fluid contained a protein of 1000-2000 mgm. per cent without pleocytosis. The authors believed that this cell-protein dissociation was specific for this symptom-complex and named this complex of findings "radiculoneuritis."

Casamajor in 1919, in describing a similar group of conditions, used the term "acute ascending paralysis" while Bradford, Bashford, and Wilson in that same year suggested the name "acute infective polyneuritis."

Kennedy in 1919, in reporting four cases made use of the term "infective neuronitis." All patients presented a seventh cranial nerve involvement. Febrile episodes usually preceded the illness. In the cases in which spinal punctures were performed, they were negative. In a single case that died, there was a polyneuritis, with a degeneration of the ventral or dorsal horns of the cord as well as of the nerve cells of the cerebral cortex. Kennedy named this symptom-complex "infective neuronitis" because he believed that any part of the neuron could be involved, either in the central or peripheral nervous systems.

In 1920 Bassoe emphasized the occurrence of meningoradicular symptoms in this syndrome. He believed this to be a clinical type of epidemic encephalitis. This same view was held by Bériel and Devic, who published a series of cases in 1925.

Francois Zuccoli and Montus in 1929 and Taylor and McDonald in 1932 again emphasized the importance of the seventh cranial nerve palsy in this ailment and reported their cases under the old term of "polyneuritis with facial diplegia.

In 1930 Strauss and Rabiner reported six cases of "myeloradiculitis," all of which recovered. The symptomatology varied from a moderate degree of radic-

ular involvement to severe paraplegia with cord involvement. Improvement was rapid and complete. One of these cases later developed a parkinsonian syndrome which would suggest that the distribution of the lesions in this patient was not only in the peripheral nerves and spinal cord but also in the cerebral hemispheres.

In 1936 Gilpin, Moersch, and Kernohan described twenty cases of "neuronitis." The majority of the patients were in the third decade of life. Sixty per cent had a history of antecedent infection. The neurological involvement was more marked in the lower extremities with the motor impairment more severe than the sensory. The sphincters were usually intact and pain was not a prominent part of the picture. The patients were usually afebrile, and there was a cell-protein dissociation in their spinal fluid which contained from 100-800 mgm. per cent of protein. The mortality rate was twenty per cent and in those that recovered, the period of recovery extended from 6 to 24 months. Pathologically, there was a degeneration of the peripheral nerves with a mild lymphocytic infiltration of the dorsal root ganglia. These authors believed their cases fell into that group of curable polyradiculitis described by Guillain, Barré and Strohl.

Chascan, Titlebaum, and Stevenson in 1940 reported seven cases under the term "myeloradiculoneuritis." One of the patients died. Clinically, these cases showed a rapid onset of weakness, primarily in the lower limbs, as well as fairly marked sensory changes of radicular or peripheral distribution. In their fatal case, the examination revealed not only involvement of the peripheral nerves but degeneration of the posterior column of the spinal cord.

In 1940 Lauria and Mandelbaum described an interesting case of acute infective polyneuritis following pneumonia. Clinically, their patient, four days after pneumonia, suddenly developed a flaccid quadroplegia, papilledema, and a unilateral seventh cranial nerve involvement. There were no sensory changes. The recovery was slow but definite.

Symptomatology

This symptom-complex may affect either sex and may occur in any age group, the ages in our series varying from 6 to 43 years.

In the majority of cases that can usually be elicited symptoms of some antecedent infection which most commonly is located in the upper respiratory tract. These may vary from such indefinite complaints as malaise, fleeting pains, and mild lethargy to such acute symptoms as sore throat, generalized headaches, chills, fever, generalized muscular aching and anorexia. In the occasional case there may be a prolonged period of headache and soreness in the neck.

Usually the neurological symptoms are fairly sudden in onset, and consist of muscular weakness or paralysis, distal hyperesthesias, radicular pain and painful aching muscles. The radicular pain may be a prominent part of the picture and may involve the extremities, the thoracic or the abdominal region. At the onset the lower extremities are more commonly implicated than the uppers, the distal parts more often than the proximal.

A few of the patients during the early stages of illness, complain of nausea, vomiting, dizziness, headache, and stiff neck. Weakness of the facial muscles on one or both sides is not uncommonly present and may appear early in the disease. Only in the more severe cases are the other cranial nerves involved such as the V, VI, IX, X, XI, and XII. Choked disc and bulbar symptoms, though uncommon, may be present but are usually transitory. Occasionally a patient may present a mild delirium.

The neurological findings may be most variable and naturally depend upon the part or parts of the nervous system implicated.

The motor involvement of the limbs manifests itself primarily in muscle weakness, starting in the lower limbs

and progressing so that there may or may not be a similar involvement of the upper extremities. The resulting paresis or paralysis is usually of a flaccid type although in some cases it may be spastic, indicating involvement of the upper motor neuron. The deep reflexes, as a rule, are reduced or absent but may be hyperactive, associated with sustained or unsustained clonus. Abdominal reflexes are usually uninvolved but may be decreased. The Babinski reflexes may or may not be present. Sensory disturbances are both of a deep and superficial type. The patients not uncommonly complain of paresthesias, hypo-esthesias, and anesthesias, the latter usually following a definite segmental or radicular distribution. Early in the disease there is a definite muscle tenderness which, as it disappears, reveals a loss of muscle and tendon pain. Position sense is occasionally disturbed, causing ataxia.

In some cases there is difficulty in voiding and the patients have a severe retention, requiring repeated catheterizations.

In spite of the severe clinical symptomatology, these patients, as a rule, show little hyperpyrexia unless there is some complicating infection in the urinary or respiratory tract. The blood picture commonly is normal or shows a mild leukocytosis. The spinal fluid findings are most variable. It has been maintained by some investigators that a highly elevated spinal protein associated with a low spinal fluid cell count is pathognomonic for this ailment. Guillain, Barre and Strohl have gone so far as to insist that the presence of 1 to 2 gms. of protein in the spinal fluid was necessary before one was justified in making a diagnosis of this symptom-complex. However, many investigators have reported similar clinical cases in which the spinal fluid studies showed no such characteristic features and in many cases was entirely normal. A high spinal fluid protein with a low cell count does, however, commonly occur and helps us in the diagnosis of this disorder. One-half of our patients showed this cell-protein dissociation. Other laboratory studies are ordinarily normal.

Course and Prognosis

In some cases the entire course of the illness may be very mild and last but a few days or weeks. Often, however, the illness has a fairly acute onset and after progressing rapidly for a few days, starts to subside. Both the motor and sensory recovery is slow but definite in spite of the apparently severe involvement. Improvement may continue for a period of years. Usually after 12 months the patients have made a fairly complete recovery with the return of the function of the extremities. Not uncommonly, the deep reflexes may remain reduced or absent for many years after the onset of the illness. Fatalities do occur but these are usually due to complications or actual involvement of the medullary centers by the pathological process.

Differential Diagnosis

Since this symptom-complex may, as its title indicates, involve any or all parts of the nervous system, it can similate any of the better established neurological disorders. Certain features have been suggested as helpful in the establishment of a diagnosis.

1. The usual absence of fever.
2. A normal or only slightly elevated leukocyte count.
3. A cell-protein dissociation in the spinal fluid; that is, a normal cell count with a high protein.
4. The absence of muscle atrophy in spite of the severe flaccid paralysis.
5. Fairly complete recovery in spite of the severity and extensiveness of the nervous system involvement.

Treatment

The treatment at present is entirely symptomatic. The following are a few of the measures that have been instituted on

the Neuropsychiatric Division.

1. Complete bed rest during the acute stage of the illness.

2. The Drinker respirator to combat the respiratory paralysis.

3. Multiple small transfusions in the acutely ill patients.

4. Large doses of vitamins B and C, especially in those cases which appear to have a radiculitis or peripheral neuritis.

5. Tidal irrigation and the sulfanilamide group of drugs to combat the urinary involvement and infection.

6. Physiotherapy for the recovering muscular involvement.

Pathology

The pathological lesions vary with the extent and location of the disease process. Chascan, Titlebaum and Stevenson, have described a peripheral neuritis with degeneration of the posterior columns of the spinal cord while Gilpin, Moersch, and Kernohan reported a destruction of all the nerve elements with no signs of actual nerve inflammation. There was some lymphocytic infiltration of the dorsal root ganglia.

In our one fatal case, the lesions were more widespread and involved many parts of the nervous system. Nerve cell injury was fairly extensive. The cranial nerve nuclei revealed acute nerve cell changes. The cells were swollen and chromatolytic with pale nuclei. Some of these cells had completely disappeared, leaving only ghost cells. The neurons throughout the spinal cord also showed these same advanced nerve cell changes. Many were shrunken and pyknotic. The cells of the cerebral cortex and the cerebellum appeared intact.

Associated with this nerve cell injury, there also occurred scattered focal demyelinization involving both gray and white matter of the hemispheres. Most of these areas were scattered around blood vessels, but some were more diffuse with no perivascular arrangement. Scavenger cells were present in many of the larger perivascular spaces. Many of the nerve rootlets were congested and an occasional rootlet revealed a loss of fibers with connective tissue replacement. It is to be noted that nothing resembling an inflammatory process was found within the nervous system.

Comment

We have elected to call this symptom-complex by the descriptive term of encephalo-myelo-radiculitis, because it most adequately describes the distribution of the clinical symptoms. It seems to us a much better descriptive and more inclusive term than the more limited names such as neuritis, peripheral neuritis with a facial diplegia, neuronitis, etc. As can be seen from our cases, the lesion may involve any or all parts of the central or peripheral nervous system and, hence, may resemble very closely, from a clinical point of view, other specific nervous system involvements. Until the isolation of some specific etiological agent, one must hesitate to accept this symptom-complex as a disease entity. Certain features, however, have been suggested as characteristic. Probably the most outstanding is the striking recovery in spite of the apparent severe damage to the nervous system. This frequently necessitates a fairly prolonged period of observation before one feels justified in classifying the illness. Certain other features have also been suggested as helpful diagnostically. Apparently the temperature and leukocyte count are not greatly altered, and the spinal fluid often shows a cell-protein dissociation. The latter observation will depend a great deal on how frequently the spinal fluid is examined during the course of the illness. However, since there is little indication for repeated spinal punctures, this cell-protein dissociation is frequently not detected. In our series it was present in one-half the cases. In one patient the spinal fluid examined at the onset of the illness was normal, while later it showed a very characteristic cell-

protein dissociation. In most of our cases, the prognosis was good in spite of the absence of any specific treatment. Those patients showing peripheral nerve involvement received large doses of thiamin chloride and cevitamic acid, while the very sick patients were treated with repeated small blood transfusions. Even the one fatal case was progressing very nicely until he, unfortunately, developed a lobar pneumonia which no doubt influenced the lethal outcome.

Pathologically, there can be no doubt that the nervous tissue elements in this symptom-complex suffer a much more severe functional or toxic disturbance than an actual anatomical tissue damage. Only such an explanation could allow for the excellent recoveries. Although many nerve cells are actually destroyed by the injurious agent, many cells show such changes which even anatomically are of a reversible nature. Even the pathological lesions present no specific features and can be observed in many other nervous system involvements.

NEUROLOGICAL INVOLVEMENTS

No.	Identif.	Age	Sex	Motor		Superficial Sensation	Sphincters	Cranial Nerves	Cell-Prot. Dissoc.	Respiratory
				Upper ext.	Lower ext.					
1		6	F	Paresis	Paresis	None	None	None	Present	None
2		16	F	None	Paresis	None	None	VII	---	None
3	.	20	M	Paresis	Paralysis	Complete to C_4	Moderate	XII	None	Severe
4		26	F	Paresis	Paralysis	None	Severe	VI, X, XII	Present	None
5		28	M	---	Paresis	Partial to L_1	None	X	None	None
6		34	M	Paresis	Paralysis	Complete to T_4	Moderate	VI, VII, IX, X, XII	Present	Severe
7	..	35	M	Paresis	Paralysis	None	None	VII	Present	None
8		40	F	None	Paralysis	Complete to T_4	Severe	None	None	None

Case 1.

, a 6-year-old white female, first became ill three weeks before admission, at which time she contracted a slight head cold which lasted approximately one week. Following this she complained of periodic attacks of abdominal pain which lasted approximately two weeks. After the patient recovered from her head cold, she was a little weak and had a tendency to fall. She vomited once after being given some medication and after taking a train to come to Minneapolis.

On admission, her temperature was 99°F. and fluctuated between 98.6°F. and 100°F. during her hospital stay. The neurological examination showed negative Kernigs and a constant nystagmus in all directions (the latter had been present since birth). She had a paresis of all extremities with definite weakness in arching her back. All her deep reflexes were reduced. The middle and lower abdominal reflexes were depressed. Her muscles were painful to pressure. Coordination was fair considering her weakness. The patient was very unstable on her feet and often fell when standing or attempting to walk, walking with a wide base. Her laboratory studies were normal. The spinal fluid was clear and contained 1 monocyte and 142 mgm. per cent of protein. The rest of the spinal fluid studies were negative. Spinal fluid culture was sterile.

The patient was started on 100 mgm. of thiamin chloride intravenously q.d. This was changed to thiamin chloride, 10 mgm. b.i.d. five days later. After six days of hospitalization the patient began to improve. Her grip seemed stronger. Her legs also recovered much of their strength. Her deep reflexes remained absent. Her gait, however, was still somewhat unsteady although greatly improved at the time of discharge.

Case 2.

., a 16-year-old white female, first became ill one month prior to her examination, at which time she developed headaches, pain on the right side of her neck and a progressing paresis of all the muscles on the right side of her face. Her facial involvement soon became complete and within a few days the patient noticed some weakness of her lower limbs. She was confined to bed for ten days and placed on large doses of thiamin chloride. An improvement of the facial palsy soon began but it was very slow. One month after the onset of the illness she still revealed extensive findings. A neurological checkup showed a partial weakness of all the facial muscles on the right side. There was still a paresis of both lower limbs with extremely hyperactive deep reflexes. The Babinski sign on the right was negative but was questionably positive on the left. Sensation was intact. No spinal fluid examination was done in this case since the patient was not hospitalized.

Case 3.

., a 20-year-old white male, first became ill six weeks prior to admission to the hospital. At that time he and many other boys at a CCC camp developed sore throat, generalized headache, fever, chills, anorexia, constipation and generalized muscular aching. After being hospitalized in the camp dispensary for five days, he felt somewhat improved and was able to work. The next day inability to void made its appearance along with constipation and generalized stiffness in the muscles of his legs, back, and abdomen. The wrist and elbow joints were somewhat painful. He noticed that his skin was numb below his neck, but hyperesthetic to light touch. Weakness became so profound that he was unable to walk. Obstipation continued. A few days later his neck became stiff, he was hospitalized in a local hospital and three days later transferred to the University Hospitals.

On admission the examination revealed an acutely ill young male, having marked respiratory difficulty without cyanosis. His breathing was almost entirely diaphragmatic. His temperature was 101.6°F.;

respiration 28; pulse 110. The neurological examination showed a slight nystagmus on lateral gaze and some weakness of tongue in lateral movement. The deep reflexes in the upper extremities were normal; the abdominal reflexes were absent; and the knee and ankle jerks were absent. Babinski's sign was bilaterally normal. There was a total flaccid paralysis of the lower extremities and only a moderate weakness in the upper limbs. The intercostal muscles were paralyzed, and there was slight pain on anteroflexion of the head on the chest. All forms of deep and superficial sensation were decreased to the level of C_4. Sensory involvement seemed more marked along the medial aspect of the upper extremities than along the lateral aspect.

The laboratory findings showed a hemoglobin of 93 per cent; white blood cell count of 7,200 with differential count of 85 per cent polymorphonuclears, 12 per cent lymphocytes, and 3 per cent monocytes. Blood urea nitrogen and serological tests of the blood for syphilis were all within normal limits. The spinal fluid was colorless, clear, under normal pressure, and contained 57 cells, 56 of which were monocytes. The spinal fluid protein was 58 mgm. per cent. The spinal fluid findings were otherwise essentially within normal limits. Spinal fluid and urine cultures showed no organisms.

The patient was immediately placed in the Drinker respirator and tube feedings were instituted because of difficulty in swallowing. He was placed on sulfanilamide for his kidney infection and given repeated small transfusions. His temperature and pulse remained elevated, and the cyanosis increased, however, three days after admission he was able to remain out of the respirator for short periods and was stronger. One week after admission he expectorated easily, moved both legs especially on the right, and showed definite strength in the intercostal muscles. A few days later he was able to rotate both lower extremities and to dorsiflex and plantar flex both feet. He was now out of the respirator for forty minute intervals. Within two weeks the strength of his legs was good, and his sensory level had now receded to approximately T_7 for pain and temperature, while he was able to appreciate touch anywhere over the body or extremities. By three weeks he had only a moderate motor and sensory residual and remained out of the respirator all day. At the time of discharge the patient was still using an indwelling catheter; decubiti were healing well; general strength was fairly good.

Case 4.

, a 26-year-old white female, first became ill one month prior to her admission to the hospital, at which time she developed an acute onset of frontal headache, soreness of the neck, acute pains in her lower extremities, and low midline backache. These symptoms were followed in a few days by crampy, low abdominal pain, nausea and vomiting. When seen by a local physician her pulse rate was 140, respiration 20, temperature 101°F. Because of the presence of what was thought to be an enlargement of the uterus, and the presence of a profuse vaginal discharge, a diagnosis of probable acute endometritis was made. Within a few days pain and tenderness appeared along the posterior aspect of the left leg, and her temperature rose to 102°F. About three weeks prior to admission both of her legs became totally paralyzed and were the site of constant discomfort because of the sharp, shooting pains. Because of difficulty in voiding, she was catheterized and 800 cc. of urine were obtained. Her general condition became critical, her temperature rising to 104°F. A spinal puncture at this time revealed 3 cells.

On admission the patient complained of rather severe pain in both lower extremities. Her tongue was dry; pulse 145 per minute, and her chest was tender over the 9th, 10th, and 11th ribs on the right side. The pelvic examination revealed a profuse mucopurulent vaginal discharge; the body of the uterus was normal in size and shape.

The neurological examination revealed a bilaterally decreased visual acuity,

the patient being able to read only fair-sized letters with some difficulty. Her fundi showed a 2 to 3 diopter choke bilaterally with many hemorrhages near the disc along the course of the blood vessels. Her pupils were large and reacted fully to light, left pupil being larger than the right. There was a bilateral 6th nerve paralysis. Her voice had a nasal twang. Movements of tongue were impaired bilaterally. The deep reflexes were hyperactive in the upper extremities and absent in the lower limbs. There was a total flaccid paralysis in the lower extremities except for slight movement of the toes. The upper extremities showed a mild paresis on the left. Her neck was rigid and painful; Kernig sign was positive on the right only. Speech was somewhat slurred.

The laboratory studies revealed a hemoglobin of 71 per cent; a white blood count of 14,700, with a normal differential. Subsequent white counts were 10,650, 9,000, and 9,800. Complement fixation and flocculation tests of the blood for syphilis were negative. Blood chemistries were all within normal limits. The spinal fluid examination showed an increased pressure of 19 mm. of mercury and a pleocytosis of 18 cells with 1 neutrophil and 17 monocytes. The protein was 76.3 mgm. per cent. The spinal fluid examined one month later showed a pressure of only 10 mm. of mercury, with no cells and 109 mgm. per cent of protein. Blood cultures were sterile and routine agglutinations negative.

During the first few days of hospitalization the patient's temperature rose gradually to reach a maximum of 102° F. Her pulse rate varied between 115 and 120, and she was rather lethargic. She was treated symptomatically and was given repeated small blood transfusions. One month after admission she began to improve. She became stronger, her papilledema began to recede. At time of discharge seven weeks after admission, she still had a total paralysis of the lower extremities but no papilledema was present. She was subsequently observed in the Outpatient Department. No improvement was noted for five months. She then began to manifest definite return of motor function. She first was able to move her left lower extremity while in the water. Spinal fluid at this time was colorless, clear with no cells, and 78 mgm. per cent of protein. Her hemoglobin was 90 per cent with a white blood cell count of 13,700, with essentially normal differential. Motion soon returned to both lower extremities when in the water, and she was fitted with braces by the orthopedic staff. When seen in Orthopedics two months later (9 months after the onset of her illness), the patient was unable to use her lower extremities except for the presence of a small amount of power in the flexors and gluteus maximus.

Case 5.

, a 28-year-old white male, became ill in the early spring of 1939, when he first experienced chest pain. A few months later he began to have severe aching pains in the right shoulder, the right side of his chest, and over the precordium. Other symptoms consisted of pounding sensations in his head, attacks of dizziness and distal paresthesias involving both hands. These were followed in a few days by periods of unconsciousness often lasting twenty minutes. Two weeks before his admission to the hospital, numbness and weakness appeared in his lower extremities. The muscles of his legs became very painful. A history was also obtained that the patient had been rather lethargic for approximately five months.

On his admission, the examination revealed a normal temperature and pulse which remained normal during the entire course of hospitalization. The neurological examination showed an abductor paralysis of the left vocal cord. All the deep reflexes were hyperactive in both lower extremities with bilateral unsustained ankle clonus and a left sided unsustained patellar clonus. There was a moderate weakness in right upper and both lower extremities associated with pain in right shoulder and right hip. Superficial sensibility was impaired in the right lower extremity up to a level approximately located at L_1.

The laboratory studies were all negative. The spinal fluid contained only 2 mononuclears and a protein of 23.8 mgm. per cent. Sedimentation rate was 13 mm. in one hour and 38 mm. in two hours. X-rays of the chest were negative.

During his stay in the hospital, improvement was definite in spite of the absence of any specific therapy. His pain and sensory disturbances disappeared, and he was discharged after a two-weeks' hospital stay.

He was followed in the Outpatient Department and when seen five months later, he still complained of chest pain, abdominal pain, and generalized weakness.

Case 6.

, a 34-year-old white male, first noticed a weakness in his lower extremities about six months before his admission to the hospital. One month before his admission he suddenly developed a severe paresis of the lower limbs, associated with a bilateral facial weakness, causing him to be unable to smile or close his eyes. Two and one-half weeks later respiratory involvement appeared followed by weakness of the arms and diplopia on looking to the right. Fever and delirium appeared about ten days before admission to the hospital.

On admission his temperature was elevated above 100° F. and rose steadily to 106.2° F. shortly before his death six days later. His blood pressure was 116/74. The patient was cyanotic, having marked difficulty in breathing with moderate diaphoresis. The neurological examination showed both optic discs to be pinker than normal. There was a bilateral abducens weakness and nystagmus on lateral gaze. Both the upper and lower facial muscles were paralyzed, and there was a weakness of the masseters on the left. The uvula was drawn to the left. The patient was unable to swallow fluids if placed on the right side of the mouth. His tongue deviated to the right although there was a bilateral weakness of the tongue. All deep and superficial reflexes were absent. There was a complete paralysis of legs and a paresis of upper extremities. His intercostals and diaphragm showed moderate weakness. The neck was painful on anteroflexion. He was unable to perform coordinated movements because of weakness. Superficial sensation was impaired to the level of T_4, vibratory sensibility was decreased in legs, and position sense was impaired in his toes.

The laboratory studies showed a hemoglobin of 92 per cent and a leukocytes count of 13,400, with a differential of 88 per cent neutrophils, 7 per cent lymphocytes, 5 per cent monocytes. The lumbar puncture produced a clear, yellow fluid under normal pressure which contained 1 mononuclear and a 3+ Nonne. The complement fixation and flocculation tests were negative.

During the first few hospital days, the patient was kept in the respirator and showed definite improvement. Some movement returned in his lower extremities. After three days, he was able to remain out of the respirator, although respiration was dependent in part on the accessory muscles. He was partially able to close the left eye. Suddenly, five days after admission, he became very dyspneic and began to expectorate large amounts of mucous. He was placed in an oxygen tent, but it soon became necessary to place him back in the Drinker respirator because of increasing respiratory weakness. A chest examination now showed the typical findings of left lower lobe atelectasis; and accordingly, bronchoscopy was performed with removal of large amounts of mucous, especially from the left lower lobe main bronchus. Sulfathiazol therapy was promptly begun. Despite the administration of oxygen and the fact that the patient was placed in the Drinker respirator, his course was progressively downhill. The pulse became very weak, and he died six days after admission. An autopsy was performed. The general autopsy findings showed a left lower lobe lobar pneumonia, an acute dilatation of the stomach and small intestine, with clouding swelling of the kidneys and a double ureter on the right side.

External examination of the brain in

the fresh state revealed an extreme vascular congestion.

Microscopic examination showed a diffuse, patchy, demyelinization were most frequent in the white matter but were also present in the cerebral cortex, especially the superficial layers. Most of the demyelinated areas were situated around small vessels but some were more diffuse and no definite perivascular arrangement could be found. Scavenger cells were present in many of the larger perivascular spaces along with macrophages containing hemosiderin. The neurons in the cranial nerve nuclei revealed acute nerve cell changes. The cells were swollen and chromatolytic, with pale nuclei. Some cells had completely disappeared, leaving ghost cells. The neurons throughout the spinal cord also revealed these same advanced nerve cell changes. The neurons in the cerebral cortex and cerebellum appeared normal. Many of the nerve rootlets were congested. An occasional rootlet showed a loss of fibers and a connective tissue replacement.

Case 7.

, a 35-year-old white male, was admitted to the hospital because of marked distal paresthesias, weakness, and ataxia of his legs. About six months prior to admission, he was cutting timber in a swamp land and waded for long periods of time in cold water. He noticed at that time some soreness and tenderness in the soles of his feet. A few months later he developed numbness and prickling sensations in the soles of both feet. This involvement gradually proceeded upward and was soon associated with paresthesias of the hands. Weakness and ataxia in the lower extremities appeared at about this same time. Pain in the chest had been present for two weeks before admission. Tinnitus had appeared in the right ear. He had been followed for a decreased visual acuity in the Eye Clinic, where his vision was apparently intact.

Patient had been ill at time of an epidemic of equine encephalitis two years previously, at which time symptoms persisted for seven days. On examination his temperature was normal, and he showed no temperature elevation during entire course of hospitalization. He showed a moderate degree of malnutrition. The neurological examination revealed a nystagmus on lateral gaze and a weakness of the facial muscles on the right. He had a bilateral hearing loss, especially on the left. His deep reflexes were active but equal and there appeared to be a slight weakness of the hand grip bilaterally. He had a definite paresis of the lower limbs and a severe ataxia, especially on performing the heel-to-knee test. His Romberg test was positive. Paresthesias were present in both the hands and feet. The lower limbs were hypo-esthetic and hypo-algesic to pin and cotton from the knees downward. Vibratory sensibility was impaired over both tibia. Muscle and tendon pain was increased in lower extremities. Both sciatic nerves were somewhat tender to palpation.

The laboratory tests were entirely normal. His spinal fluid contained 4 mononuclear cells and 134 mgm. per cent of protein. Treatment consisted of a light cradle over the lower limbs; thiamin chloride, mgm. 5 b.i.d.; cevitanic acid, mgm. 25 t.i.d.; nicotinic acid, mgm. 50 q.d. After a period of perhaps ten days, the patient was free from pain, and his hyperesthesias were no longer present. When examined one month later at the time of his discharge, his knee jerks were depressed with the right ankle jerk greater than the left. Strength in his lower extremities was fair, while the heel-to-knee test still showed some incoordination. Improvement continued after his discharge. When seen one month later, his legs were stronger, although his feet remained tender. He was now able to walk about three blocks. He still showed a slight facial weakness on the right. His reflexes were active, his strength good, and coordination fair. Distal hyperesthesias in legs persisted.

Case 8.

,, was a 40-year-old white female, whose present illness dated back one

and one-half months prior to admission, at which time she first developed pain in the left chest. In approximately two weeks, this was followed by pain in the right axilla and in the right upper extremity. A few weeks later she noted the onset of weakness of the back and paresthesias in both lower extremities. Abdominal discomfort, nausea and vomiting soon followed. One week before admission to the hospital, shooting pain appeared in both forearms, and the patient lost her ability to walk because of the severe weakness in her legs. Within a few days she was lethargic, and there was some stiffness of the neck; urinary and fecal incontinence appeared on the following day.

Examination on admission revealed the patient to be lethargic. Temperature was 99.8° F.; pulse rate 98, and respiratory rate 24. Her blood pressure was 128/84. Neurological examination revealed pupils that reacted sluggishly to light. The rest of the cranial nerves were normal. Her neck was somewhat rigid. All the deep reflexes were normal and equal; abdominal reflexes were absent and the Babinskis were normal bilaterally. There was a moderate paresis of left lower extremity and practically complete paralysis of the right lower limb, the patient being able to move only the toes of the right foot. Superficial sensory impairment was present with the upper level varying frequently from T_2 to T_{10}. Vibratory sensibility was absent in both lower extremities.

The laboratory studies were negative except for an occasional slight leukocytosis. The spinal fluid examined shortly after admission was colorless, clear, and showed a cell count of 16 monocytes with a protein of 38 mgm. per cent. Complement fixation, flocculation tests and colloidal gold reaction were negative. The blood cultures were sterile on two separate occasions, but the spinal fluid cultures showed staphylococcus albus.

The patient was treated symptomatically. She was given thiamin chloride, mgm. 9 daily, and cevitamic acid, 25 mgm. daily.

Her involvement progressed during the first few days in the hospital. Examination three days after admission revealed that she now had bilaterally positive Hoffmann reflexes and that her knee jerks were increased. Her Babinskis were positive and ankle clonus was bilaterally present. The upper border of sensory level was still at approximately T_4. The patient appeared toxic but was conscious and rational although at times lethargic. After the first week her condition began to improve, although her neurological findings often fluctuated from day to day.

She was discharged after one month of hospitalization. Her examination at this time revealed negative cranial nerves. All the deep reflexes on the right were more active than on the left, with a positive Hoffmann on the right. The ankle and patellar clonus were sustained on the right and unsustained on the left. Her right leg was weaker than the left. Light touch and vibratory sensibility were reduced in the lower limbs. In spite of a severe urinary retention upon admission, only 15 cc. of residual urine were present at discharge. Samples of serum submitted to the U. S. Public Health Service showed no protection against a virus of lymphocytic choriomeningitis in mice.

After leaving the hospital the patient was followed in the Outpatient Department. Improvement continued so that one month later she was able to walk unassisted.

At the time of her last examination one year later, she was almost completely recovered. She still showed a slight residual spasticity and numbness of the left lower limb but was otherwise quite recovered.

References

1. Bassoe, P.
Delirious and Meningoradicular Types of Epidemic Encephalitis
J.A.M.A. 74:1009, (April 10) 1920.

2. Beŕiel and Devic
Presse méd. 33: 1441, (Oct. 31) 1925.

3. Casamajor, L.
Paralysis Among Troops
Arch. Neurol. & Psychiat. 2:605, (Dec.) 1919.

4. Shaskan, D., Teitelbaum, H.A., and Stevenson, L.D.
Myeloradiculoneuritis with Cell-Protein Dissociation
Arch. Neurol. & Psychiat. 44:599-610, 1940.

5. Francois, Zuccoli, G. and Montus, G.
Rev. Neurol. 36:95, (Jan.) 1929.

6. Gilpin, S. F., Moersch, F. P., and Kernohan, J. W.
Polyneuritis, A Clinical and Pathological Study of a Special Group of Cases Frequently Referred to as Instances of Neuronitis
Arch. Neurol. and Psychiat. 35:937, (May) 1936.

7. Guillain, G.
Radiculoneuritis with Acellular Hyperalbuminosis of the Cerebrospinal Fluid.
Arch. Neurol. & Psychiat. 36:975,1936.

8. Guillain, G., Barré, J. A. and Strohl, A.
Bull. et mém. Soc. méd. d. hôp. de Paris 40:1462, (Oct. 13) 1916.

9. Kennedy, F.
Infective Neuronitis
Arch. Neurol. & Psychiat. 2:621, (Oct.) 1919.

10. Louria, A. L. and Mandelbaum, H.
Acute Infectious Polyneuronitis following Pneumonia
J.A.M.A. 115:1188, 1940.

11. Osler, W.
Principles and Practice of Medicine, ed. 1, New York, D. Appleton & Co., 1892;
ed. 8, New York, D. Appleton & Co., 1916, p. 1022.

12. Patrick, H. T.
Facial Diplegia in Multiple Neuritis
J. Nerv. & Ment. Dis. 44:322, (Oct.) 1916.

13. Strauss, I. and Rabiner, A. M.
Myeloradiculitis
Arch. Neurol. & Psychiat. 23:240, 1930.

14. Taylor, E. W., and McDonald, C. A.
A Syndrome of Polyneuritis with Facial Diplegia
Arch. Neurol. and Psychiat. 27:79, (Jan.) 1932.

V. GOSSIP

Minnesotans are state minded people. I have lived in other states, but I have never been so conscious of the interest of all sections in the state as a whole as I have here. Perhaps it may be because I am at the University and the University Hospitals (state institutions), but I find the same spirit in everyone, for, after all, our people use the state as their playgrounds and vacation everywhere. All of this is just an excuse for telling you some of the things I learned from a book entitled "Minnesota - A State Guide," compiled and written by the Federal Writers' Project of the Works Progress Administration of the American Guide Series, published by The Viking Press in New York, 1938. The attractive volume contains a wealth of information about Minnesota. The annual events include winter carnivals, a dog derby, amateur boxing tournaments, ski meets, snow modeling, speed and fancy skating contests, iceboat races, Indian fairs, curling Bonspiels, Bach Society concerts, sportsman shows, rifle matches, flower exhibits, college fetes, choir festivals, Indian pow-wows, air shows, polo matches, raspberry, melon, sweet corn, lefse, kolacky and sauerkraut days, Indian rice dances, lumberjacks, Paul Bunyan festival, and special Zinnia, Peony, Lilac, and Mum shows. The volume contains a number of attractive pictures and the story of Minnesota's past. There is the usual resume of assets, the story of its major cities, but, most interesting of all, tours through Minnesota which are so arranged that the attractive features of the present and past are given about each place. Minneapolis was originally called "St. Anthony," and St. Paul had the distinction of being known as "Pig Eye." At one time there was only one Scandinavian in Minneapolis. When the second one came, the original settlers tried to speak to him in French and Gaelic (Mr. Mousseau and Mr. Broderick). We have a Mousseau and a Broderick in the secretarial force of President Ford's Office now. Minneapolis has always been noted as a city of homes, parks, and hospitality; not yet 90 years old, it has one of the foremost educational systems in the country. The West Hotel, now torn down, had incorporated in its structure the ideas of LeRoy Buffington, which were subsequently adopted in the construction of sky scrapers. The Minneapolis Public Library is the outgrowth of the Athenaeum, organized in 1859 by Dr. Kirby Spencer, a dentist, to lend books to shareholders and subscribers...The Foshay Tower was developed in its unique design because its creator admired the Washington Monument. The Rand Tower on the other hand is considered an outstanding example of good architecture. The Law Library in the City and County Building has a $250,000 collection of all state and federal statutes and reporter systems of all English-speaking countries. St. Mary's Church, Russian Orthodox, is a part of the orthodox bishopric of Alaska and the Aleutian Islands and is the center for more than 2,000 Carpo-Russians residing Minneapolis. Historic Minnehaha Park is the scene of Longfellow's poem. Michael Dowling's name is given to the School for Crippled Children because after he lost both legs, one arm and several fingers in a blizzard, he overcame his handicap and became a leading citizen. Of particular interest to us is the bronze marker just to the left of the bridge going down Washington Avenue toward town which fixes the site of Cheever's landing. At one time there was a 90 foot tower called Cheevertown which was labeled "Pay a dime and climb." Minneapolis is predominantly Scandinavian and New England. St. Paul is equally interesting because it is the seat of our government. The Minnesota Historical Society is one of our oldest institutions. Our State Health Department was the third to be established in the United States. Minneapolis in its palmiest days could never keep up with St. Paul in aggressiveness. Its population being primarily German, Irish, and Italian. Similar interesting facts are to be found about Duluth, which extends 24 miles along the edge of Lake Superior, varying in width from 1 to 4 miles. It is described as the most distinctly different of all mid-western cities. It has had many unkind things said about it, but at the same time has become Minnesota's most publicized city. St. Cloud is most noted for its German settlement and granite quarries. It is difficult to separate Rochester from the name of Mayo, for as such it is known around the world. It was named after Rochester, New York. Winona is an inter-

esting city. One of its leading citizens in the early days was Dr. Ford, a physician whose son is now the President of the University of Minnesota. Winona was a lumber town. In the tours which cover the State, I find the following: Temperance River is so named because it does not have a bar at its mouth. Onion River belongs to the Paul Bunyan Legend, as it represents the tears of the loggers as they came in contact with the wild onions which grew in the area. If the lighthouse at Split Rock did not function, it would cause many marine disasters for the magnetic attraction of the rocks diverts the compass needle by several degrees. At Little Marais, a corundum mine lost out in competition with synthetic carborundum. Wherever Finns are found, there you will find the "Sauna" or steam bathhouse. A lumberjack left Barnum when the mills quit operation. He became so lonesome in far off Louisiana that he came back with a poultry catalog as his only idea for the future. Today Barnum is one of the largest egg producing sections in the State and the majority of the people make their living by poultry raising. Hinckley reveres the name of Jim Root, who saved 350 persons in the fire by backing his train thru a wall of flames as the burning Grindstone Creek Bridge gave way as his engine cleared the span. His hands were burned to the throttle. Bald Eagle is named for the lake where bald eagles once nested on an island. It was just below Hastings that the steamboat Chippewa Falls grounded on a bar in the low water of 1864. She drew only 12 inches and the pilot ever after insisted that he floated her free by a quick starboard-to-port shift of his "chaw" of tobacco. At Nininger will be found the home of Ignatious Donnelly, the "Apostle of Protest" who also tried to prove that Lord Bacon was the author of Shakespeare's Plays. At Frontenac will be found point-no-point which is a peculiar mirage to be seen while rounding a bend which seems to have no ending. It was also at Frontenac that so many famous characters of the very early days of Minnesota were accustomed to gather. At Askov the Danes cleared 20,000 acres of cut-over land. It is now the rutabaga center of the country and has never had a jail because of its law-abiding citizens. Read's Landing was known during the American Revolution because of its activity as a fur trading center. At Little Fork, there have been no crop failures. It is said to be the most favorable region in all the United States for production of clover and alfalfa seed. At Bemidji development of shelter-belt potatoes for seed has resulted in an entirely new source of revenue. At Browerville, 700 population, St. Joseph's Roman Catholic has a $10,000 pipe organ, and the sculptures in the church were carved by Joseph Kieselewski, a local boy who was one of the youngest artists ever to be awarded the Prix de Rome. Sauk Center, boyhood home of Sinclair Lewis, was inspiration of his "Main Street." Kaolin is found near Redwood Falls. Heron Lake was once the nesting place for many varieties of game birds. The iron range district is one of the most interesting sections of Minnesota. Even today, high school graduating classes represent from 28 to 34 nationalities. Garden City, population 275, was boyhood home of Sir Henry Wellcome, famous member of the London Drug firm. He left it $400,000 to build a library and auditorium. At Northcote Jim Hill had his famous 25,000 acre farm with 15,000 acres under cultivation. This Red River Valley development had a house on it which cost $49,000 in 1912. Yellow Medicine County is named after the roots of the yellow moonseed used by the Indians. Ivanhoe was named for the hero of Sir Walter Scott's novels and the streets have the names of the leading characters in the book. Salol was named by pulling some labels out of a drugstore drawer. The story of Minnesota's paper mills is intensely interesting, including the one at the border which can turn out 1100 feet a minute. Zumbrota has Minnesota's only covered bridge. Fergus Falls once had a German postmaster who could not read English. He dumped the mail on the floor and let the people help themselves. Howard Lake is named after John Howard, the great English exponent of prison reform. Montevideo is named after the capitol of Uruguay and has a flag presented by its South American neighbor. At Fairmount Oxford and Cambridge grads made the other settlers stay thru the ravages of locusts (same old spirit). Attired in hunting coats, they rode to the hounds over hill and stream in quest of any quarry that appeared. And so on the story goes with many an interesting fact (and fiction) about Minnesota.