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

Guillian-Barre's Disease

Volume XV | Friday, November 19, 1943 | Number 8

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

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

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William A. O'Brien

I. LAST WEEK

Date: November 12, 1943

Place: Recreation Room, Powell Hall

Time: 12:15 to

Program: "Perirectal Abscess and Fistula"
William C. Bernstein
Walter A. Fansler

Discussion: J. K. Anderson
Harry Christianson
Walter A. Fansler
H. S. Diehl

Attendance: 97

Alice Carlson,
Record Librarian

- - -

II. MEETINGS

1. ANATOMY SEMINAR

Saturday, November 20, 1943, 11:30 a.m., Room 226, Institute of Anatomy.

Leukemia in Man and Animals: Effect of colchicine on lymphoid neoplasms.

Arthur Kirschbaum

- - -

2. PATHOLOGY SEMINAR

Monday, November 22, 1943, 12:30 p.m., Room 104, Institute of Anatomy

"Tracheo Bronchial Tuberculosis"
Sumner S. Cohen
George K. Higgins

- - -

3. PREVENTIVE MEDICINE SEMINAR

Monday, November 22, 1943, 4:00 p.m., Room 116 Millard Hall.

"Communicable Diseases in Guatemala"

Wesley W. Spink

- - -

4. PHARMACOLOGY SEMINAR

Wednesday, November 24, 1943, 12:30 p.m., Room 105 Millard Hall.

"Distribution of Quinine and Atabrine"

Raymond N. Bieter

- - -

III. FROM THE MAIL BAG

I am enclosing a check for another year of the Staff meeting bulletins. They are well worth it, not only because it proves that the old school is still in step with the rest of the country professionally, but also because the fragments of gossip about my friends are about the only thing I hear about them.

Well, this is a little over three years at this post. I wonder what comes next. Whatever is decided is right with me because I have had so much pleasure being here that I feel I owe the Army a good deal. The work is harder than it ever was at home because in spite of all rumor the average army hospital is NOT overstaffed. Certainly not this one.

I hope that I will be able to see the hospital and all my friends before the war is over. It has been about 2 years now since I have been able to get home. Best regards,

Carl J. Lind, Jr.,
Lt. Col., M.C.

Thank you very kindly for putting me on your mailing list as we appreciate getting the Bulletins. Most sincerely yours,

W. J. Kiser
Major, Medical Corps

Received the first two bulletins of the General Staff Meeting of the University of Minnesota Hospitals, which were as interesting as ever, very anxious to continue to get them.

The scientific meetings and Dr. O'Brien's gossip are always interesting.

Very truly yours,

B. A. Flesche,
Major, M.C.

- - -

IV. GUILLAIN-BARRÉ'S DISEASE (ENCEPHALO-MYELO-RADICULITIS)

A. B. Baker

The symptom-complex commonly referred to as Guillain-Barré's syndrome has been recognized since 1892 when Osler first described it under the term of "acute febrile polyneuritis." Since that time, cases apparently belonging to this same group have been described under a wide variety of terms (radiculoneuritis" (Guillain, Barré and Strohl, Guillain), "acute ascending paralysis (Casamajor), "acute infective polyneuritis" (Bradford, Bashford and Wilson), "infective neuronitis" (Kennedy), "polyneuritis with facial diplegia" (Francois, Zuccoli and Montus and Taylor and McDonald), "myeloradiculitis" (Strauss and Rabiner), "neuronitis" (Gilpin, Moersch and Kernohan), "myeloradiculoneuritis" (Shaskan, Teitelbaum and Stevenson) and "encephalomyelo-radiculitis" (Polan and Baker)). Since this disease seems capable of involving almost any part of the nervous system, the resulting clinical symptoms and signs naturally are most variable, hence making the differentiation of this illness from variants of already well-known neurological disorders often very difficult. Therefore, it is impossible at present to determine definitely whether the numerous cases reported in the literature actually belong to the same symptom-complex or whether they are the result of totally unrelated disease processes. Most of the cases reported, however, do have so many features in common, which definitely differ from the characteristics observed in other neurological disorders, that one is unable to avoid the conviction that they represent a specific disease entity, probably of virus nature. Such an impression is strengthened when one considers the detailed histopathological alterations observed in our fatal cases which, in many aspects, resembled those lesions observed in both proved and suspected virus infections.

In a previous publication we reported 8 cases of Guillain-Barré's disease under the title of "encephalo-myelo-radiculitis". This descriptive term was selected because it seemed most adequately to describe the distribution of the clinical symptoms in our cases and appeared to be a much more inclusive term than the more limited names used to date by other investigators. However, even such a title has certain definite defects. Primarily, it is too complicated for general use. Even more important is the fact that this disease may confine itself to selected regions of the nervous system, and the resulting clinical picture would, therefore, not necessarily correspond to such an inclusive title as "encephalomyelo-radiculitis." In order to avoid the confusion of conflicting terminology, it would seem best, at least until some specific etiological agent is isolated, to refer to this condition as Guillain-Barré's disease since these investigators did emphasize the characterizing features of this illness. Guillain, Barré and Strohl and Guillain first reported on this illness in 1916 and again in 1936, recording a total of 12 cases. Their patients all developed a flaccid paralysis of the limbs with some involvement of both deep and superficial sensation. In all their cases, the spinal fluid contained an elevated protein without pleocytosis; and it was this cell-protein dissociation that these authors considered specific for this illness.

Characterizing Features of Guillain-Barré's Disease

In order to adequately describe the criteria used in the diagnosis of this disease, it becomes necessary to discuss briefly those features which characterize this illness. It is only after one has a clear picture of the entire morbid process, including its differentiating characteristics and its clinical course, that one is able to identify this illness from among the many similar diseases encountered in the neurological field.

1. A rather sudden onset occasionally preceded by a history of some antecedent infection, chiefly of the respiratory passages.

2. Absence of those findings suggestive of a septic or toxic reaction in spite of the severe clinical symp-

tomatology. The patients as a rule show almost no hyperpyrexia unless there is some complicating infection in the urinary or respiratory tracts. It is very impressive to observe so little effect upon the body temperature in individuals with such acute severe generalized nervous system involvement. The pulse also is unchanged and continues to be full and regular. The blood picture generally is unaltered, but at times the leucocytes may be slightly elevated, counts as high as 15,000 cells per cubic millimeter having been recorded.

3. A cell-protein dissociation in the spinal fluid with a normal cell count and a high protein. This finding has been advocated as being one of the most characteristic features of this illness. Many investigators, however, have felt that too much emphasis has been placed upon this cell-protein dissociation and that it alone is neither pathognomonic nor absolutely necessary for a diagnosis of this disease. The absence of such protein elevation in otherwise fairly typical cases has been reported by Taylor and McDonald, Margulis, and Polan and Baker. It has been generally accepted that the degree of protein in the spinal fluid varies with the stage of the illness, and the presence of an elevated protein will naturally depend a great deal on how frequently the spinal fluid is examined.

4. Radicular involvement. This is one of the most constant features of this disease regardless of the region of the nervous system predominantly implicated at the height of the illness. The radicular pain is early in onset and, although involving primarily the extremities, may appear in any region of the body.

5. Facial nerve palsy. Generally one can say that the presence of a facial weakness is very helpful and extremely suggestive of this syndrome but is by no means necessary for a diagnosis.

6. Absence of mental symptoms even in the presence of a very severe illness. Very few investigators have reported mental symptoms in this disease. Occasionally, however, in the more severely involved cases, mild delirium with disorientation, restlessness, and excitement may occur. Somnolence and mild lethargy are by no means uncommon and are usually observed early in such patients.

7. Favorable prognosis usually with fairly good functional recovery. Generally recovery is the rule in this illness regardless of the severity of the clinical picture, but in many of the more severe cases, residuals or even fatalities will eventuate.

From a review of the above features of this illness, it is readily apparent that there is no single characteristic that can be designated as diagnostic. In view of the absence of any specific etiological agent, one is forced to accept a more practical attitude in regard to this illness and to consider in the diagnosis all the features presented. It is only after a careful consideration of all the symptoms and signs that one can arrive at a final satisfactory diagnosis. This frequently will necessitate a fairly prolonged period of observation before one feels justified in classifying the illness and venturing a prognosis.

Clinical Forms

Many descriptions of the clinical features of this illness have appeared in the literature. One finds, however, that generally the symptomatology has been too greatly over-simplified. The neurological complaints and findings may be most variable and will naturally depend upon the part or parts of the nervous system implicated. Usually, the involvement tends to be accentuated within certain regions, thus producing a predominating symptomatology. For convenience, therefore, one might classify the clinical pictures seen in this condition into five forms, depending upon the region most severely involved; namely, the abortive or mononeuritic, the polyneuritic, the myelitic, the bulbar and the cerebral types of illness. Although all the above forms of this disease seem to differ greatly clinically, they do

present certain related features. Probably the most outstanding are the radicular pain, the acute muscle tenderness and the marked clinical improvement in spite of an apparently severe damage to the nervous system.

Type 1. Abortive or mononeuritic form.

There can be no doubt that slight attacks of this illness do occur and pass unrecognized, thus making the frequency probably much greater than is generally recognized. In our experience it is this form that has been most greatly underemphasized, probably because the rigid criteria set up by Guillain have been too closely adhered to. During that period when we were seeing most of our cases, many patients were studied who presented complaints which were identical to those observed in the early stages of Guillain-Barré's syndrome. These individuals gave a history of a sudden onset of severe radicular pain often preceded by some antecedent infection of the upper respiratory passages. The radicular pain was at first fleeting in character, involving the limbs or the trunk and was often associated with some muscular aching and severe headache. This pain not uncommonly would disappear within a few days only to return after a latent period of several weeks; occasionally it did not disappear but became localized to a single limb, where it was soon followed by muscular weakness or paralysis, distal hyperesthesias and very painful aching muscles. In spite of the predominantly mononeuritic symptomatology, careful neurological examination almost always revealed other scattered findings indicative of the more diffuse nature of the actual involvement (case 31). In some patients this form of the illness made its appearance as a classical Bell's palsy, only to reveal on examination associated findings of such a mild nature that they would not be expected to produce functional disturbances and hence would almost invariably be overlooked by the patient.

Usually in the abortive form the illness begins to recede after about two weeks, with complete recovery eventuating in about a month. In an occasional severe case, the weakness may persist for many months and be accompanied by a mild but definite muscular atrophy (case 31). The following case illustrates this form of the disease.

Case 33: P.H., a 62-year-old farmer, while plowing suddenly developed a severe momentary sharp pain in the upper medial aspect of the right thigh followed within a few hours by some soreness and stiffness in the same extremity. That evening he developed tenseness in the adductor muscles. The pain became progressively worse, was not relieved by medicinal treatment and prevented him from sleeping. Because of the persistence of this pain, he was finally hospitalized for further treatment.

Examination revealed the patient's pupils to be slightly irregular. The middle and lower abdominal reflexes were absent as was also the right knee jerk. There was considerable limitation in the movement of the right leg due to pain and the muscles in this limb were very sensitive to pressure. There was an area of hyperesthesia over the medial aspect of the right thigh. Laboratory studies revealed a blood count of 7,500 with 65 per cent polymorphonuclears and 35 per cent mononuclears. A spinal puncture showed no cells and 75 mgm. per cent of protein.

The patient remained in the hospital for three weeks, during which time he gradually improved. Ten days after admission he developed hiccoughs which continued for one week with only short intervals of relief. During this same period he became mildly confused and disoriented. Following recovery from the hiccoughs, the confusion also cleared up, but the patient continued to be somewhat irritable and suspicious.

The pain in his thigh gradually decreased, so that at the time of his discharge he appeared to be completely recovered. The entire course of his illness was afebrile.

Type II. Polyneuritic form.

This is the most frequently described form of this illness although many cases listed as a polyneuritis actually show extensive signs of cord involvement. These patients usually, after a few promonitory signs suggestive of the abortive form of the illness, or after a latent interval following an upper respiratory infection, develop either a gradual or often a sudden onset of motor weakness involving the limbs, primarily the lower extremities. This motor weakness is of a flaccid type and at its onset almost always involves the entire extremity. Individual muscles are almost never picked out, and there appears to be a definite tendency to implicate the larger muscle groups of the proximal regions of the limbs, namely, the thighs, the pelvic and the shoulder girdle. Weakness in the upper extremities usually occurs later than the involvement of the lower limbs and is often less severe. Not uncommonly the muscles of the trunk and of the anterior abdominal wall are also implicated, resulting in difficulty in raising or sitting up in bed. Only exceptionally does the distal musculature become weakened early in the disease and even in these cases the palsy soon spreads to the entire extremity with the most severe disabilities occurring in the shoulder and hip regions.

Paresthesias, hyperesthesias and anesthesias with severe muscular pain may precede or accompany the motor weakness. In some cases, the sensory involvement may be much more extensive and severe than the motor impairment and may comprise the predominant part of the clinical picture. Occasionally, when the sensory involvement is severe, it not uncommonly follows a glove-stocking distribution. In such cases the paresthesias may persist throughout the entire course of the illness and may create a serious treatment problem. Headaches of a most intense type occur and may continue throughout the early part of the disease.

Case 11: K.B., a 23-year-old housewife, first became ill in July 1942. At that time she suddenly developed headaches, vomiting, diplopia and some dizziness. These symptoms were periodic and occurred every other day for about two weeks and then disappeared. Two weeks later and five days before her admission to the hospital, she first noticed low back pain followed by numbness in her hands and feet and some difficulty in walking. At first she was able to get around but became very tired on the slightest exertion. A few days later she noted that when she raised either of her arms to the level of her shoulders there was a tingling sensation in the arms and the hands. The involvement of her extremities continued to progress until she was unable to walk and was finally forced to enter the hospital. At the time of her admission she was able to get around only with assistance.

Neurological examination showed a slight ocular imbalance with a fine lateral nystagmus to both the right and the left. There was a left lower facial paralysis and a paresis of all limbs with a generalized areflexia. The abdominals were absent; and the Babinski reflexes were negative. She had a fine tremor of the hands and on coordination showed a slight past pointing to the left. There was a hypesthesia and hypalgesia in both hands and in both legs below the knees. Vibration sense was decreased at the wrists and ankles.

Laboratory studies were negative except for the spinal fluid which contained 1 cell and a protein content of 217 mgm. per cent.

The patient was treated by complete bed rest and a high vitamin intake. She showed a very definite but gradual improvement both subjectively and objectively. Ten days after admission, sensation began to return to her extremities, followed within a few days by improvement also in her motor function. By the time she left the hospital, one month after her admission, sensation was normal as was also most of her muscle strength. The abdominal reflexes were still absent, and the only muscular impairment was a slight weakness of grip in her left hand. During her hospital stay, her blood studies showed 8,600 leucocytes with 75-25 differential.

Sedimentation rate was 17.5.

Type III. Myelitic form.

In our experience, this form of the illness appears to be the most frequent, comprising almost one half of our cases. The progress of the illness is very dramatic and a severely involved individual may make a fairly rapid and almost spectacular recovery in a very short time. More often than in any other form, the onset may be sudden and the course rapid with no premonitory symptoms. These patients complain of a slight numbness and tingling in the lower limbs followed within a few hours by a marked paresis that may develop into a complete paralysis within a very short time. The motor involvement is usually of a flaccid type, although in some cases it may be partially spastic, indicating involvement of the upper motor neuron. The deep reflexes are usually reduced or absent, but may be hyperactive associated with sustained or unsustained clonus. Early in the disease there is definite muscle tenderness, which as it disappears reveals a loss of muscle and tendon pain. If the illness is very severe, there may develop a similar involvement of the upper extremities. Sensory disturbances, primarily the superficial type, comprise a prominent part of the clinical picture and is of a definite segmental nature, ascending with the progression of the disease and producing a definite sensory level as is so often seen in a transverse myelitis. Bowel and bladder dysfunction occur relatively early, resulting in a urinary retention and bowel incontinence or constipation. Aside from the typical cord involvement, these patients also develop severe radicular pain and scattered cranial nerve palsies. The spinal fluid protein becomes elevated early, thus facilitating the diagnosis. The spinal fluid cell count at first may also be elevated, but soon returns to within normal limits.

The course is very impressive. After a continued progression for from two to four weeks, the illness suddenly begins to recede and the rapid recovery can be followed clinically by checking the level of the sensory disturbance, which diminishes daily and is associated with a concomitant improvement in the muscular palsies. The paresthesias disappear as soon as improvement begins. Recovery is usually complete although some residuals do remain in the form of a persistent paresis of scattered muscle groups.

Case 13: Mrs. I.P., was well until the morning of November 1, 1942, when she awoke to find she had bladder and bowel incontinence. She found it very difficult to walk to the bathroom because of the weakness of her lower limbs. She also noticed numbness and tingling in both lower extremities and anesthesia in the area of the buttocks. During the next four days her weakness and sensory involvement progressed and she was finally hospitalized for three weeks in a local hospital, from where she was transferred to our care on November 28, 1942.

At the time of her admission she showed a complete paralysis of the lower limbs with hyperactive knee jerks, but absent ankle jerks and abdominal reflexes. There was a hypesthesia below the 10th dorsal cord level; and muscle pain was markedly increased.

A spinal puncture revealed no increase in pressure, 1 cell, 132 mgm. per cent of protein and a negative colloidal gold curve. Her white blood count was 7,300 with 63 per cent polymorphonuclears. The serology was negative.

Under symptomatic treatment, she showed a very slow but definite improvement. After two weeks her severe muscle tenderness disappeared and she became much more comfortable. Her sensory involvement gradually receded and within a few weeks had entirely cleared up, leaving only a small anesthetic area about the buttocks. Strength also gradually returned to her limbs so that after one month she was able to move her legs freely even though they were definitely paretic. Sphincter control was also regained at this time and the catheter was removed. The neurological examination at the time of discharge revealed a slight right lateral nystagmus, absence of the abdominals, and slightly increased muscle pain in the left leg. Her knee jerks were still hyperactive and her ankle

jerks absent.

Type IV. Bulbar form.

This type of the illness is almost invariably accompanied by involvement of other parts of the nervous system, even though the bulbar symptoms do comprise the most impressive part of the clinical syndrome. In most cases, the bulbar symptoms occur only after the illness has been in progress for some time, although in the occasional case the cranial nerve damage appears suddenly and early, and overshadows all other findings. Almost any of the cranial nerves may be implicated, resulting in ophthalmoplegias, diplopia, anisocoria, facial anesthesia or hypesthesias, vertigo, dysarthria, dysphagia, and dysphonias. Unilateral or bilateral facial palsies are extremely frequent and often very severe. In an occasional case the medullary damage may be so severe that even respiratory and cardiac irregularities occur. One of our patients (case 17) developed a complete external ophthalmoplegia with subsequent involvement of almost every cranial nerve. Aside from the facial palsies, the most common bulbar symptoms consist of disturbances in articulation and deglutition. Speech becomes nasal in type and fluids are regurgitated through the nose.

In most cases there occurs an associated involvement of the limbs with pareses, sensory disturbances and reflex irregularities. Curiously enough, cerebral findings are not more common in this form of the illness, the patients remaining mentally clear in the face of a most extensive bulbar damage.

In spite of the apparently severe involvement in such a vital region, the prognosis is usually good although in the bulbar form of Guillain-Barré's disease, the occasional case does terminate fatally from a medullary paralysis.

Case 17: ,, a 30-year-old housewife, became ill one week after she returned from a trip to California. Shortly after her return home, she developed a mild diarrhea but no other symptoms. On March 12, 1941, while getting on a streetcar, she suddenly felt a numbness in both lower limbs. There were no other complaints until the following morning, when she discovered that she had difficulty in opening her right eye, and a blurring of vision on looking to the right. Her legs continued to be numb and weak, resulting in an unsteady gait.

She was seen three days after the onset of her illness, at which time her cranial nerves were negative with the exception of a slight ptosis of the right lid. Deep reflexes were hyperactive with a bilateral positive Hoffmann, but negative Babinskis. The abdominal reflexes were reduced on the right and absent on the left. There was marked weakness of the right arm and shoulder girdle. Her coordination was intact, as was also her deep sensation. Superficial sensation revealed hypesthesia in the right upper extremity along the dorsal cord level. There was also a hypesthesia over the left thigh and leg. During the next few days the patient's condition progressed very rapidly. Within four days she developed signs of a bulbar involvement, for which she was hospitalized.

On March 17 examination revealed a partial involvement of all the extraocular muscles, a ptosis of both lids, paresthesia and hypesthesia over the face, bilateral facial and palatal paralysis, and a bilateral weakness of the tongue. Deep reflexes were reduced, although obtainable. She had a diffuse patchy involvement of superficial sensation involving primarily the limbs. During the next few days her condition continued to progress. She developed a complete paralysis of all the extraocular muscles with bilateral involvement of the 5th, 7th, 9th, 10th and 12th cranial nerves. The vagus involvement at times became very alarming because of the resulting bradycardia. She also experienced severe pain in all her limbs and very severe muscle tenderness. Mentally she remained clear, and showed no elevation of temperature or of her leucocyte count.

After a period of ten days the

patient's illness began to subside and she was discharged from the hospital one month after admission, at which time she still had a severe diplopia, a nasal type of speech and a bilateral facial weakness. She was not able to swallow and her pulse had returned to normal. There was still slight weakness in the extremities, although all sensory disturbances had disappeared.

The patient was followed for over two years. Throughout this period improvement has continued, and when examined two years after the acute illness, her cranial nerves were negative with the exception of a persistent mild bilateral facial weakness. Strength had returned to all limbs, and her reflexes were now normal.

Type V. Cerebral form.

This is an extremely rare and not usually recognized type of Guillain-Barré's disease. It usually begins with severe headaches, malaise, vertigo and nausea. The patients feel weak and remain in bed for a few days. The symptoms may then subside only to be followed by mild facial weakness or scattered radicular pains. After a few days, the headaches again return and are often accompanied by a mild lethargy which tends to increase in severity. As the illness progresses, signs of cord or bulbar involvement may develop. Some patients become confused, noisy, restless and agitated. It is in this form of the illness that papilledema usually appears. The prognosis must be guarded, although many patients make a fairly complete recovery.

Case 24: E.H., a 39-year-old housewife, became ill in the latter part of September, 1941, at which time she complained of a suboccipital headache, generalized malaise, anorexia, chills and a mild elevation of temperature. Within a few days she became mildly lethargic and tended to sleep excessively. Her headaches were very intense and persistent, but there was no nausea or vomiting. Within a week these symptoms began to subside, but she now developed a urinary retention. She was catheterized by the local doctor, who finally sent her to the hospital for further investigation.

General examination revealed a very obese female. Neurological findings showed a mild papillitis of both discs. There was an anisocoria with the right pupil being larger than the left. The deep reflexes were normal except for the right knee jerk, which was slightly more active than the left. There was generalized muscular weakness of all four extremities. The patient was unable to void.

Laboratory studies showed a white count of 8,350 with 84-16 differential. Spinal fluid showed 22 cells with a protein 58 mgm. per cent.

The patient remained under observation for one month. During that time she regained her bladder control and the papillitis disappeared. At the time of her discharge from the hospital she still had a marked weakness of both lower limbs and her deep reflexes were now slightly hyperactive. She was seen two months later and during that period had improved to such an extent that she was now neurologically negative, having made a complete recovery.

A summary of all our cases is given in Table I.

Course and Prognosis

Guillain in his publications insisted that the outcome of this disease was always favorable and that all cases recovered fairly promptly and completely after an illness of a few weeks or months. He felt that the real syndrome was always benign. It is apparent from a review of the literature as well as from a study of our own cases, that this point of view is somewhat too extreme. It is true that in spite of a fairly severe clinical involvement, these patients usually show a gradual and continuous improvement over a period of many months or years with fairly complete recovery. However, the more cases one studies and the longer one follows the recovered patients, the more cautious one becomes regarding the ul-

TABLE I

CLINICAL FEATURES OF GUILLAIN-BARRÉ'S DISEASE

Case No.	Name	Sex	Age	Date of Onset	*Type of Illness	Facial Palsy	Other bulbar Symptoms	Choked disc	Spinal Fluid		Temperature	Period Followed	Leucocyte Count	Outcome
									Protein	Cells				
1		F	18 mo.	Jan. 1943	III	-	-	-	88	1	97-99	1 mo.	4,700	Paresis all limbs
2		F	6	Aug. 1940	III	-	-	-	142	1	99 100	11 mo.	8,200	Complete recovery
3		F	12	Mar. 1942	III	-	-	-	41	2	98.6	3 mo.	11,000	Complete recovery
4		M	14	Dec. 1942	II	-	-	-	43	4	98-99.6	2 mo.	10,300	Paraplegia
5		M	15	Dec. 1942	II IV	+	+	-	197	2	98			
6		F	16	Oct. 1940	I	+	-	-				24 mo.		Residual paresis right arm and leg
7		F	19	Dec. 1938	I	-	-	-	46	0	97.8 99	24 mo.	6,400	Complete recovery
8		M	20	Mar. 1939	III	-	-	-	58	57	101.6	3 mo.	7,200	Residual paresis of lower limbs
9		F	24	Sept. 1942	IV	+	+	-	345	5	99-101	2 mo.	7,200	Residual paraplegia
10		M	25	Apr. 1941	II	-	+	-			98.6	20 mo.	7,600	Complete recovery
11		F	26	July 1942	II	+	+	-	217	1	98.6 99.6	1 mo.	8,600	Generalized hyporeflexia
12		F	26	Dec. 1939	III	-	+	+	109	0	98.6 102	36 mo.	10,650 9,000	Paresis lower limbs
13		F	27	Nov. 1942	III	-	-	-	132	0	98.6	3 mo.	7,300	Paresis legs. Sphincter disturbance
14		F	27	Nov. 1940	V	+	+	-	177	7	98-101	1.5 mo.	10,600	Death
15		M	28	July 1939	III	-	+	-	23.8	2	97-98.6	4 mo.	5,800	Complete recovery

TABLE I (Cont.)

16		F	29	Apr. 1940	III	+	+	+	243	0	99	8 da.	12,000	Death
17		F	30	Mar. 1941	III IV	+	+	-		0	99	23 mo.		Persistent facial weakness
18		F	30	Jan. 1943	I	-	-	-	34	0	98.6	1 mo.		Persistent radicular pain
19		M	34	Dec. 1939	III IV	+	+	+	3+ Nonne	1	99-100	6 mo.	13,400	Death
20		M	35	Dec. 1939	II	+	-	-	134	4	97-99	36 mo.	6,300	Paresis lower limbs
21		M	36	Dec. 1941	I	-	-	-			98.6	3 mo.		Complete recovery
22		F	37	Mar. 1938	V	-	-	+	18.4	1	98-99.8	48 mo.	15,000	Complete recovery
23		M	38	May 1941	II	-	+	+	253	11	98.6 99	21 mo.	9,700	Paresis lower limbs
24		F	39	Oct. 1941	III V	-	+	+	58	22	98-99.2	3 mo.	8,350	Complete recovery
25		F	40	July 1939	III	-	-	-	38	16	99-100	18 mo.	8,800	Paresis lower limbs
26		M	40	Sept. 1942	III	-	-	-	65.9 118	1-154	98-100	3 mo.	11,800	Complete recovery
27		F	41	Dec. 1941	III	-	-	-	190	0	97.8 98.8	13 mo.	7,500	Quadriplegia
28		M	44	Dec. 1941	I	-	-	-	38.12	1	98.2 99.6	12 mo.	5,500	Complete recovery
29		M	45	Dec. 1941	I	-	-	-	-	-	98.6	3.5 mo.	-	Complete recovery
30		M	46	Aug. 1942	II	-	-	-	153	0	98.6	6 mo.		Paresis right leg and hands
31		M	57	Dec. 1942	I	-	-	-	76	0	97-98.6	12 mo.	10,650	Paresis left leg.
32		M	57	Dec. 1941	III	-	-	-	151	5	98.6	12 mo.	5,700	Paresis right leg, hypesthesia left hand
33		M	62	May 1940	I	-	+	-	75	0	98.6	4 mo.	7,500	Complete recovery

*I. Abortive or mononeuritic; II. Polyneuritic; III. Myelitic; IV. Bulbar; V. Cerebral

timate prognosis.

In the abortive or mononeuritic form, the entire course of the illness may be very mild and last but a few weeks with complete recovery. But even in such cases, if careful followup studies are performed years afterward, residual weakness and reflex abnormalities may be elicited.

In most cases, usually after an acute onset and after progressing rapidly for a few days or weeks, this illness becomes stationary or starts to subside with improvement often being very slow and continuing for many years. The sensory recovery is much more rapid than the motor, and not uncommonly some motor weakness and reflex alterations can be observed for many years after the acute illness. We have obtained followup studies on many of our patients, and have been impressed by the frequency and often the severity of the neurological sequelae present after two to three years. In none of the more involved cases had complete recovery eventuated, and many of the patients still had incapacitating residuals such as sphincter disturbances, unilateral or bilateral limb weakness. The one optimistic feature in all these cases was that improvement apparently was still in progress in spite of the long interval since the primary infection and it is possible that in time complete functional return might occur.

Recurrence of symptomatology occurred in only one of our cases (case 17), who during the course of two years had repeated relapses requiring complete bed rest. In most cases it appears that improvement once begun continues uninterrupted, providing moderate care and rest is obtained.

Differential Diagnosis

Because of the wide variability of the clinical symptoms in this disease, it is often confused with variants of other well-known neurologic disorders from which it must be differentiated before an accurate diagnosis can be made. For this reason it might be well to discuss briefly a few of the differential points between the Guillain-Barré syndrome and other neurological disorders.

1. Peripheral neuritis of an infectious or toxic type.

Usually in this illness the course is febrile and an elevated leucocyte count may be present. The nervous system involvement tends to remain localized to the limbs and only uncommonly extends to the brain or spinal cord; hence, cranial nerve palsies, segmental cord lesions, and weakness of the trunk and back muscles almost never occur in the average case. The spread of the involvement within the extremities is fairly constant, progressing symmetrically from the distal to the proximal regions and producing first sensory and later motor impairment. Scattered radicular pain usually does not occur, the paresthesias observed being evenly and consistently distributed to the distal portions of the extremities. In Guillain-Barré's disease, on the other hand, the entire limb often becomes weak at one time with the predominant functional disturbances within the proximal muscle groups such as those of the pelvic and shoulder girdle. The involvements spread consistently to the trunk with resulting weakness of the back and abdominal musculature. An elevated protein with a cell-protein dissociation is exceedingly uncommon in the toxic or infectious peripheral neuritis.

2. Poliomyelitis.

This disease may produce a very difficult differential problem and, no doubt, many cases diagnoses as atypical poliomyelitis actually are instances of Guillain-Barré's disease. Certain features, when carefully evaluated, aid greatly in the differentiation. In poliomyelitis the course is usually more febrile and the patients more constantly show manifestations of meningeal irritation with some nuchal rigidity and an increased cell count in the spinal fluid; the spinal protein remaining within normal limits. The involvement is predominantly and usually exclusively of a lower motor neuron type and tends to

select scattered muscles or muscle groups rather than an entire extremity as is so common in Guillain-Barré's disease. Spastic weakness and sensory disturbances are almost never seen. The prognosis in poliomyelitis is usually not so favorable since residual weakness and severe muscle atrophies are much more frequent and pronounced.

3. Myelitic syndromes secondary to infections.

The course of the disease in an infectious myelitis is usually much slower than in Guillain-Barré's disease, and the patients appear much more toxic. After reaching its peak the infectious process tends to remain unchanged for long periods, resulting in extensive trophic changes associated with motor and sensory residuals. These patients often remain bedridden for long periods and produce some of the most difficult nursing problems encountered in the neurological field. Radicular and cerebral involvements are almost never seen, and the sensory impairment when it occurs, is usually of segmental rather than a radicular distribution. The spinal fluid may show an elevated protein but usually contains an associated cell increase.

4. Multiple sclerosis.

This condition is often difficult to differentiate from the myelitic form of Guillain-Barré's disease, especially when the latter tends to show involvement of the pyramidal system. Generally, however, multiple sclerosis produces much more spastic weakness and less sensory disturbances. Radicular pain and severe muscle tenderness almost never occur. Although cranial nerve findings are present, they usually involve the second rather than the seventh cranial nerve, producing optic atrophy rather than a facial palsy. A speech disturbance may be present in both illnesses but in multiple sclerosis it is scanning in type and can occur independent of a severe bulbar involvement, while in Guillain-Barré's disease the dysarthria appears only after the disease has spread to the bulb and is the direct result of the extensive bulbar palsy.

Treatment

The treatment at present is entirely symptomatic. The following are a few of the measures that, in our experience, have proved beneficial.

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

2. Medication and particularly heat to combat the severe discomforts of the radicular pain and muscle tenderness. The treatment of these painful limbs often constitutes one of the most trying therapeutic problems in this disease, especially since these pains may persist throughout the course of the illness.

3. Large doses of vitamins B_1 and C, especially in those cases which appear to have a radiculitis or a polyneuritis.

4. Tidal bladder irrigation and the sulfonamide group of drugs to combat urinary involvement and infection in those cases with sphincter disturbances.

5. Multiple small transfusions in the acutely ill patient.

6. Maintenance of an adequate nourishment in the acutely ill patient.

7. Physiotherapy for the muscular involvement as recovery begins.

Pathology

It has been definitely established that extensive alterations do occur throughout the nervous system, the pathological lesions varying with the extent and locations of the disease process.

In a previous publication case 19 was briefly reported. This was a 34-year-old male who first noticed a weakness in his lower limbs six months before his admission to the hospital. This weakness gradually increased in severity during the next five months, at which time there first appeared a bilateral facial palsy.

Within the next few weeks the course of the illness was very rapid with the appearance of respiratory difficulty, diplopia and weakness of the arms.

On admission to the hospital the patient had marked respiratory difficulty and was placed in a respirator. Neurological examination revealed an extensive involvement of the cranial nerves with nystagmus, bilateral facial palsy, masseter weakness on the left, dysphagia, and some dysarthria. All deep and superficial reflexes were absent. There was a paresis of all limbs and an impaired superficial sensation to the fourth dorsal segment. Spinal puncture revealed 1 cell and a 3+ Nonne. The patient's course continued rapidly down-hill and he died six days after admission from an apparent respiratory paralysis.

Pathologic observations.

External examination of the brain revealed an extreme vascular congestion. The most striking alterations consisted of scattered areas of perivascular demyelinization, involving primarily the gray and white matter of the cerebral hemispheres and to a lesser degree the basal nuclei. The rest of the nervous system contained none of these changes. These perivascular alterations varied from a moderate distention of the perivascular spaces to an extensive tissue destruction. Within the damaged tissue the changes seemed to be limited primarily to the myelin sheaths, the axons usually showing only a mild swelling and irregularity. Besides this perivascular demyelinization, many of the smaller cerebral vessels showed a marked endothelial proliferation with a partial to a complete lumen occlusion.

Nerve cell damage, although fairly extensive, was limited almost entirely to the brain stem. The cortical neurons were uninvolved. A few cells within the basal ganglia showed a mild swelling with a partial chromatolysis. The most severe neuronal alterations were observed within isolated cranial nerve nuclei; namely, the facial and the dorsal nuclei of the vagus. Here many of the cells were swollen and chromalytic with pale nuclei. A few of these swollen cells were irregular in outline, vacuolated and had lost most of their tinctorial properties, appearing as ghost cells.

The spinal cord contained surprisingly few changes. A few scattered motor cells within the various cord segments showed mild alterations of a definite reversible nature. The cord white substance was uninvolved. The rootlets, especially in the lumbar regions, revealed a partial destruction of their myelin sheaths with some swelling, fragmentation and even myelin disappearance. The axons were only partially altered, a few being entirely absent. The damaged portions of the rootlets were replaced by a moderate Schwannian proliferation.

The peripheral nerves, especially the lower limbs, revealed an extensive patchy myelin injury which selected isolated areas throughout the nerves. The neurokeratin network within these damaged regions were condensed into geometric figures. The axons were swollen, irregular and in certain areas fragmented. No cellular reaction was visible in any of the nerves.

Summary and Conclusions

1. Thirty-three cases of Guillain-Barré's disease are reported. In two of the fatal cases complete autopsy studies were obtained.

2. Since this disease may involve any part of the peripheral or central nervous system, we have divided the resulting clinical syndromes into five forms, depending upon the region of the nervous system most severely implicated. These consist of (1) the abortive or mononeuritic; (2) the polyneuritic; (3) the myelitic; (4) the bulbar; and (5) the cerebral types of Guillain-Barré's disease. The myelitic form is the most frequent, occurring in 45 per cent of our patients as compared to 24 per cent with mononeuritic symptoms and but 21 per cent with polyneuritic findings.

3. Certain features when associated with any of the above clinical forms of

this disease, aid greatly in the diagnoses. These consist of: marked radicular pain and muscle tenderness; a normal or only slightly elevated temperature and leucocyte count; a cell-protein dissociation in the spinal fluid; a facial palsy; and a favorable prognosis in spite of an apparently severe illness.

4. In spite of the apparent optimistic outlook in this disease, careful follow-up studies in older cases indicate that neurological residuals to occur very frequently, especially in the more severely involved individuals.

5. This disease seems to occur predominantly during the winter months, although scattered cases may be seen throughout the year.

6. The visible histopathologic changes consist of perivascular foci of demyelinization scattered throughout the cerebral hemispheres, neuronal alterations within the cranial nerve nuclei and patchy areas of myelin destruction within the peripheral nerves.

7. The perivascular distribution of the cerebral lesions suggest a hematogenous spread of the noxious agent.

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V. GOSSIP

Minnesota's tuberculosis death rate was 25.5 in 1942. Eleven counties had rates of 10 or less, namely Martin, Cottonwood, Stevens, Rock, Waseca, Murray, Olmsted, Jackson, Nobles, Pipestone, Lincoln. The Indian tuberculosis death rate in the state was 223.4....Heavy snows and near zero weather this week reminded many of the famous Armistice Day storm of a few years ago. M. G. Neale of the College of Education recalled that 40 cars of hunters were blocked 7 miles from the highway. Over 50 shovelers hacked their way through drifts to clear roads in a job that took all day. Greatest urge for the farmers was to get to town and purchase cigarettes and tobacco. Most farm houses could accommodate visitors and all lived high as individual ducks were served to each guest for dinner and supper. Many of our staff recall the equally famous blizzard when the Minnesota Society of Radiologists was stalled in drifts as Rochester members waited in vain for the visitors to arrive. On both sides of the storm the roads were dry and the sun was shining. Just to keep the record clear, the complaints of visitors on our campus from the southern part of the United States and the Golden West do not mean too much to those who have had to spend winters in those sections. It may be cold here but it is also winter there....Sam Weiseman is back. He is the first medical officer of U. S. General Hospital #26 to return to this country. Everyone is anxious to see him and to hear of his experiences. We are all proud of Sam who was the oldest man in the unit....The other evening I spoke to a lay group in St. Paul on Medicine and the War. A question and answer period followed. The queries indicated that the people are getting close to our new medical problems. I had intelligent requests for information on such subjects as perforated ear drum, allergy, and sinusitis, complications of malaria, spread of dysentery, food infection in camps, elephantiasis, fatigue and neuropsychiatric disorders. The audience was warned to give returning service men a rest and freedom from eternal questioning by the curious. One woman whose son had been on 52 missions told of his distinguished flying cross with seven clusters. His first day home was exhausting as relatives and friends interviewed him from morning to night. Greatest concern over elephantiasis comes from friends and relatives of men in the Navy....In Duluth last Thursday to speak to the St. Louis County Medical Society as guest of the Duluth Clinic. An afternoon visit at the clinic gave some indication of how hard our practicing physicians are working today. Dr. A. T. Laird, former medical director of Nopeming Sanatorium in St. Louis County (retired) is now back helping out the clinic. A grand dinner at the Kitchigammi Club with excellent table conversation. We had to leave too soon for the meeting. Duluth physicians always provide good medical society reception and are tops with me. Following the program to an open house for the interns who entertained the staff. Duluth physicians take their staff responsibilities seriously and as a result provide one of the most attractive internships in the state. Many have gone into service including big chief Charlie Mead who is in the Navy....A letter from Lt. Col. Edward S. Murphy, the ophthalmologist from Missoula, Montana to report his arrival overseas as a member of the Surgeons Staff in one of the theaters of war. Murph wishes to be remembered to his friends and now realizes what soldiers meant when they said they wanted more mail....At Glen Lake Sanatorium to speak to the public health nurses of Hennepin County on terminology in tuberculosis. This is a fascinating subject in any field. Much medical thinking and most lay health education fails because of lack of understanding of the terms involved. Tendency is, the more simple the term the less exact the usage....To a country school in the county to speak before a group of parents and teachers and everyone proud of their lunch service for pupils. A cook is employed full-time and food is purchased through special appropriation from the state. Well balanced meals are served and neighboring gardeners contribute their share of fresh and canned foods. The dining hall is clean and kitchen equipment is above average. Surprising is the number of people who have been patients at University Hospitals and all speak with great affection of their doctor (no head of a department was mentioned, usually a fellow or junior staff man). One man was

so sorry to hear of Dr. Laird's misfortune, the young Canadian who Diepped into Germany and now receives aid from his country for a substitute lower extremity. Some of the older people remembered our older staff men. Nothing has quite impressed me so much that we are a county hospital in the best use of the term... Another group of "Kenny" physicians are here this week to study the current concept of Infantile Paralysis. This is the last regular scheduled course for physicians until the first of the year. To date 58 courses have been attended by over 900 physicians, technicians and nurses....Will malaria become a public health problem in Minnesota? We have the mosquitoes, (anopheles quadrimaculatus, anopheles punctipennis,anopheles walkeri, anopheles maculipennis). Heaviest concentration is in southeastern border of state along the river. Physicians must become acquainted with malaria as a diagnostic and therapeutic peoblem. The public health authorities hesitate to say that it will be of concern to them. Our houses are well screened, probably among the best in the states; our warm summer evenings are too few in number for vectors to spread the disease; and the summer season is quickly over. There will be an increase in civilian cases for a time and then they will drop off... ..The Dight Institute of the University of Minnesota has just published its first bulletin. Lund Press, Inc. has done the printing for the University of Minnesota Press. The late Charles Fremont Dight, M.D., of Minneapolis was best known as an eccentric person who lived in a tree-top house (called a bird house). Newspaper readers will remember him as the author of over 300 letters to the people's mail bag. Others will recall him as health officer medical school teacher, and medical director of an insurance company. He served for a time as alderman member of the socialist party but in his late years he was most active in eugenics. When he died he left his money for the establishment of the Charles Fremont Dight Institute for the Promotion of Human Genetics. The agency is under the directorship of Clarence P. Oliver. The annual income from the bequest is $4500 a year which meets current expenses and provides a modest program of research. An annual lecture is offered and physicians and others interested in genetics may submit problems for opinion. Special study is being made of human breast cancer. Physicians apparently do not realize the importance of collecting complete in- - formation when attempting to make genetic studies. Dr. Dight's bequest is unusual. His salary probably never exceded $1,500 until he was over 70 years old. His frugal living and wise investments created the estate which established his bequest. Although he will be remembered for this gift by scientists, others will recall his tree-top house at 4818 39th avenue south near Minnehaha Falls. He was fond of the literaru and sentimental associations of this locality. The house was designed entirely for his own use following an unsuccessful marriage. It did not have an enclosed foundation. A spiral iron stair case led to a small porch on the side. Another porch on the front encircled a tree. The interior was divided into a living room and bedroom. All space was utilized efficiently. The bed was hinged and a bathtub was placed underneath. A pump on the rear platform was used to raise water. There were no sewer connections. The problem of heating in winter was not really solved by the owner and architect for he wore overshoes and covered the floor with newspapers in cold weather. The walls were lined with inscriptions and mottoes including one on the outside. He abandoned his dwelling place in 1920 for more orthodox quarters. I guess it is the boy in me but the place had possibilities....The following physicians from Missoula, Montana belong to the Minnesota Club and receive the Bulletin each week: E. K. George, W. E. Harris, H. J. Hall, A. R. Foss, H. M. Blegen, L. R. Alderson, S. N. Preston, F. H. Lowe, J. P. Ritchey, C. L. Farabaugh, L. W. Brewer, and J. M. Nelson . . . . . .