mind was lucid throughout the illness. She could always put the spatula in her mouth during the spasms to prevent damage to her tongue.

Treatment

General.—Special points to be emphasized: separate and darkened room; quiet enforced; special day and night nurses.

Specific.—Serum: 200,000 units concentrated A.T.S. intravenously the first day; 40,000 units intramuscularly the second, repeated on the third and fourth days.

Sulphonamide Chemotherapy.—Soluseptasine 10 c.cm. 5% solution four-hourly from admission for twenty-four hours, then 1 gramme sulphapyridine by mouth with an occasional injection of the former if the tablets could not be taken. Sulphonamide therapy stopped on the third day owing to the patient being markedly cyanosed.

Sedatives.—(1) Evipan sodium 0.5 to 0.75 gramme; intravenous and intramuscular injections enabled the patient to obtain four to five hours' repose. (2) Avertin, given in a dosage of 0.1 gramme per kg. body weight, provided lengthy and adequate rest. (3) Paraldehyde, 5 to 6 drachms rectally, was of little value. (4) Nembutal, 4½ grains by oral and rectal routes, gave very short periods of rest. (5) Chloral hydrate, 60 grains orally, gave much comfort during the day, two doses usually being sufficient. (6) Hypodermic injection of morphine 1/3 grain appeared a beneficial substitute for the chloral hydrate.

Diet.—We were always able to feed the patient by mouth with fluids, small and frequent quantities being taken through a straw. Fluids given: Horlick's, ovaltine, glucose fruit drinks, meat broths, bovril; egg, milk, and brandy beaten up together; also cream brought in by the patient's relatives. From the eleventh day she was able to take soft solids such as fish and vegetable purées, jellies, etc.

Oral hygiene: Mouth cleansed with glycothymolin swabs.

Back: This was treated daily.

Bowels kept open by gentle enema.

Rash: Calamine and carbolic lotion employed for this.

Vaginal discharge: Gentle hydrogen peroxide douches daily.

Differential Diagnosis

The conditions to be excluded in the diagnosis were tetany, strychnine poisoning, and local oral disease. Tetany is distinguished by the presence of hyperexcitability of the motor nerves and typical spasms of the limbs, all of which were absent in our patient. It is interesting to record the case of a woman, admitted two days after the one under discussion, who twenty-four hours after childbirth developed trismus and risus sardonius, associated, however, with carpopedal spasm, and who responded satisfactorily to calcium therapy.

Strychnine poisoning was excluded by the fact that the woman's muscles did not relax between the paroxysmal spasms, and local trismus by the absence of oral sepsis, etc.

Despite our inability to isolate the tetanus bacillus, confirmatory evidence of the diagnosis is implicit in the successful issue of the case following antitoxin therapy.

Discussion

It has been assumed in this case that infection with the *B. tetani* entered via the lacerated vaginal tissues. No positive evidence, however, can be offered to substantiate this assumption, smears and cultures being negative. We believe that we are justified in accepting the patient's statement concerning the absence of any other traumatic lesion that might have given rise to her condition. The presence of a foul sanguineous discharge per vaginam two days after admission is in our opinion strong evidence supporting our theory regarding the site of infection. Should the above conclusion be correct, whence did the offending tetanus bacillus originate? Here again we are faced with the lack of certain evidence.

We have no knowledge as to the asepsis of the obstetrical procedures, and were unable to obtain any of the material

used in suturing the perineal lacerations. What importance can be attached to the fact that the baby did not develop tetanus? It is probable that the mother inoculated herself from the rectum, remembering that the bacterial flora of the human body can include the tetanus bacillus (Gardner, 1938; Mackie and McCartney, 1938). It is strange, therefore, that infection does not occur with greater frequency.

The long incubation period, slow development of symptoms, absence of marked pyrexia, and survival of the patient after ten days from the onset were all favourable points in assessing the prognosis.

Treatment consisted in providing adequate nourishment, assuring sufficient rest with a variety of sedatives, and the institution of tetanus antitoxin therapy, as recommended by Paterson of Australia (Price, 1937), an initial massive dose of 200,000 units being employed intravenously. It is probable that the intramuscular doses were unnecessary. No antitoxin was given intrathecally, one of us (B. M.) having seen cases of aseptic meningitis following the introduction of serum by this route.

Summary

A case of tetanus following childbirth is described, and the possibility of infection via a lacerated vagina or perineum discussed.

The merits of various sedatives employed are noted.

The success of antitoxin therapy along the lines suggested by Paterson of Australia is emphasized.

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SAND-FLY FEVER AND BENIGN LYMPHOCYTIC MENINGITIS

BY

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During my period of service from May, 1940, to February, 1941, as acting medical specialist to the Naval patients at a general military hospital a number of cases of benign lymphocytic meningitis were admitted. It was observed that the symptomatology of this disease closely simulated that of sand-fly fever, and in a certain number of cases the diagnosis was established only after lumbar puncture.

The Army medical specialist—Major E. H. Evans—and I decided to investigate this similarity further. It was considered unreasonable and inadvisable to submit all cases of sand-fly fever to lumbar puncture. This form of investigation and treatment was therefore reserved for (1) cases sent in as meningitis; (2) cases sent in as sand-fly fever or pharyngitis, with a complaint of occipital headache or pain in the neck; (3) cases sent in as sand-fly fever, pharyngitis, or with any other diagnosis in which there was neck rigidity, head retraction, Kernig's sign, or other indication of a possible meningitis. Unfortunately before our investigations were completed I received a fresh appointment. It was therefore decided that I should publish my findings on the cases under my care, and that Major Evans should report his further investigations at a later date.

From August 7 to December 12, 1940, 15 patients were admitted who gave the necessary indications for lumbar

puncture: 8 proved to have benign lymphocytic meningitis and 7 had sand-fly fever. The season for sand-fly fever officially ends on November 18, so that the case admitted on December 12, which proved to be one of benign lymphocytic meningitis, would appear to disprove the association of the sand-fly with this form of meningitis. However, a sand-fly was killed in the medical mess a few days after this case was admitted. The patients were, of course, all men; 14 were 31 years of age or under, the other was 44. Major Evans demonstrated to me that the incidence curve of the cases of benign lymphocytic meningitis followed almost precisely the incidence curve of cases of sand-fly fever admitted during 1940.

With the exception of 2 cases the duration of the disease on admission was forty-eight hours or less. One of these exceptions was a case of sand-fly fever and the other of benign lymphocytic meningitis, and the duration was four and five days respectively. Progress in the two conditions was equally satisfactory and recovery was rapid. The treatment consisted of lumbar puncture and the four-hourly administration of a mixture of aspirin, phenacetin, and caffeine citrate. Sulphapyridine was not used.

Symptoms and Physical Signs

The following is an analysis of the symptoms and physical signs of the 15 cases:

	Benign Lymphocytic Meningitis (8 Cases)		Sand-fly Fever (7 Cases)	
	No. of Cases	%	No. of Cases	%
<i>Symptoms</i>				
Orbital pain	8	100	5	71.4
Photophobia	4	50	2	28.6
Frontal headache	8	100	7	100
Occipital	5	62.5	2	28.6
Vomiting	6	75	1	14.3
Pain in neck	7	87.5	5	71.4
Spontaneous	3	37.5	4	57.1
On flexion	7	87.5	4	57.1
Pain in joints	1	12.5	2	28.6
" " muscles	1	12.5	4	57.1
" " back	4	50	2	28.6
Slight sore throat	1	12.5	—	—
Mild rigor	1	12.5	2	28.6
Diarrhoea	—	—	3*	42.8
Temperature on admission	98.8°–101.8°		100.2°–103.2°	
Pulse	50–90 (Av. 75)		80–104 (Av. 93)	
<i>Physical Signs</i>				
Conjunctival congestion	2	25	3	42.8
Congested fauces	1	12.5	3	42.8
Bronchitis (slight)	1	12.5	1	14.3
Tenderness in right hypochondrium (slight)	1	12.5	—	—
Neck rigidity	7(3slight)	87.5	2(1slight)	28.6
Retraction of head (slight)	1	12.5	—	—
Reflexes:				
Sluggish pupillary light reaction	1	12.5	1	14.3
Biceps absent	5	62.5	6	85.7
Triceps absent	2	25	4	57.1
Supinator absent	4	50	6	85.7
Knee-jerk absent both sides	1	12.5	2	28.6
" " right side	—	—	1	14.3
" " left side	—	—	2	28.6
" " sluggish both sides	—	—	1	14.3
" " right side	1	12.5	—	—
" " left side	2	25	3	42.8
" " right side	—	—	1	14.3
Ankle-jerk absent both sides	—	—	1	14.3
" " left side	—	—	1	14.3
" " right side	—	—	1	14.3
Plantar reflexes:				
Extensor right side	Normal	—	1	14.3
Not elicited left side	—	—	1	14.3
Abdominal reflexes:				
Absent both sides	—	—	2	28.6
" left side	1	12.5	1	14.3
Sluggish both sides	—	—	1	14.3
Positive Kernig	4(2slight)	50	1	14.3
Budzinski	Normal	—	(left side) Normal	—
Lumbar puncture:				
Normal pressure	4	50	6	85.7
Slightly increased pressure	2	25	1†	14.3
Moderately	2	25	—	—
Cells: Lymphocytes	74–332 per c.mm. (Av. 183)		1–5 per c.mm.	

The cerebrospinal fluid was clear in all cases and reactions normal except for slightly increased protein content in the benign lymphocytic meningitis cases. This increase was in proportion to the number of cells present.

* One case two days before onset of sand-fly fever.

† Patient had right extensor plantar, which became normal after lumbar puncture.

Commentary

Analysis reveals that the cardinal symptoms and signs of sand-fly fever—namely, frontal headache, orbital pain, photophobia, pains in the back, fever, and conjunctival congestion—are duplicated in benign lymphocytic meningitis. Symptoms that may occur in both conditions but are more commonly present in sand-fly fever are diarrhoea, muscular pains, and to a lesser extent pains in the joints. Symptoms which may occur in both conditions but which are more commonly present in benign lymphocytic meningitis are occipital headache and vomiting. Pain in the neck, especially on flexion, was more frequently met with in benign lymphocytic meningitis, but was surprisingly common in sand-fly fever.

It will be observed that the temperature and pulse rate are higher in sand-fly fever and that congestion of the fauces is more common. Head retraction was not seen in any case of sand-fly fever and was most uncommon in the type of meningitis under discussion. Neck rigidity, however, was a fairly constant sign in benign lymphocytic meningitis, but was present also in 28% of the sand-fly fever cases. (It will be remembered that only cases which presented possible meningeal symptoms or physical signs are dealt with here.)

Abnormal ocular reflexes were equally rare in the two conditions. As regards peripheral nerve reflexes, it will be observed that without exception they were absent slightly more often in sand-fly fever than in benign lymphocytic meningitis. The only case showing a definitely abnormal plantar reflex proved to be a case of sand-fly fever. That patient also had cerebrospinal fluid under slightly increased pressure, and his plantar response returned to normal on the day after lumbar puncture. Kernig's sign was positive in only 50% of the cases of meningitis, and occurred in one case of sand-fly fever.

As a result of these experiences it was customary to suspect the case to be one of benign lymphocytic meningitis if the patient complained of occipital headache, pain in the neck, or vomiting. Moderate fever, comparatively slow pulse rate, neck rigidity, retraction of head, and any abnormal reflexes were also suggestive of this condition. Head retraction alone excluded sand-fly fever; and vomiting, slow pulse rate, moderate pyrexia, neck rigidity, and a positive Kernig were strong presumptive evidence of benign lymphocytic meningitis.

It is nevertheless true that several cases thought to be benign lymphocytic meningitis proved to be sand-fly fever, and vice versa, the examination of the cerebrospinal fluid producing an unexpected report. It would therefore appear that benign lymphocytic meningitis is made up of a group of diseases, and that the virus of sand-fly fever is capable of producing the condition.

The annual report for 1939 of the Director-General of Public Health, New South Wales, deals with a population of more than 2,700,000. The low death rate of 9.75 per 1,000 was nevertheless 5% above the average for the preceding five years; the birth rate was 17.46. The report states that the incidence of typhoid fever was the lowest yet recorded. Diphtheria shows some increase on the previous year, despite a widespread scheme of immunization, in which the State Government co-operates with local authorities. Satisfactory progress is recorded in the field of maternal and infant welfare. A consultant service is provided for the poorer patients; a mobile blood transfusion unit is also available. Every maternal death is reviewed by a medical committee. At the pre-natal clinics attendances increased by 40% over the figure for the previous year. This compares most favourably with the increase of 2% recorded in the preceding report.