of the pons showed marked inflammatory changes, most pronounced in the dorsal portion, with numerous small hemorrhages. The bulb showed no inflammatory changes.

REPORT OF AUTHOR'S CASE

The case which I wish to report is the following:

Mrs. N. A., a pregnant woman aged 35, entered the obstetric service of the University of California Hospital, April 23, 1919, complaining of edema of the legs and hands of one month's duration, and aching pains in both arms during the previous week. The pregnancy was one month past term. She had had one full term pregnancy six years before, complicated with marked edema, and some eye symptoms and pains in the legs during the last month, which had disappeared shortly after delivery. Her past history was otherwise negative. She had not had influenza, nor had any one in her immediate family.

Physical examination was negative except for the presence of a full term fetus in the left occipito-anterior position, varicosities of both legs with more edema of the legs than these could account for, and moderate edema of the hands.

Her mentality was rather low, but her mind seemed clear. Sensory examination disclosed a slight hyperesthesia to touch and pain over the posterior part of each shoulder; elsewhere sensation was normal. The pupillary reactions were normal. The deep reflexes were somewhat exaggerated, with a false patellar clonus. The left abdominal reflex was increased, the right was doubtful. There was a right sided Babinski reflex. Both hands showed a constant tremor, which increased if the patient tried to control it, but decreased if her attention was diverted. The blood pressure was 140 systolic and 95 diastolic. The urine showed the faintest possible trace of albumin with no casts. Both blood and urinary nitrogen were normal, and blood and urine cultures sterile. As all her teeth had been extracted dental roentgenograms were not taken and there were no other foci of infection demonstrable. The hemoglobin was 55 per cent. Sahli; the blood Wassermann reaction was negative. The temperature on the day of entry was 37.5 C. (99.5 F.), on the following day 37.2 C. (98.9 F.). After this it was normal for five days, until delivery. The pains in her arms persisted and at times were so severe as to require morphin for sleep. April 30, after five hours of normal labor, she was delivered of a child weighing 4,600 gm. (10 pounds). Following delivery she had a low grade fever, never higher than 37.6 (99.7 F.) and therefore not requiring a uterine culture. On the tenth day the temperature reached 38 C. (100.4 F.). It was now noticed that she had become very dull mentally and seemed in a sort of stupor most of the time. She was easily aroused, and when addressed answered rationally and was clearly oriented. She complained of diplopia, and said that the pain in her arms kept her awake at night. A slight ptosis of the left lid and a right sided facial paralysis developed. The Babinski reflex had now disappeared, the other reflexes and the sensory findings remaining about the same. There were no signs of meningeal involvement.

A spinal puncture, May 15, yielded a clear fluid under slightly increased pressure. The Nonne and Noguchi reactions were negative, the cell count was twenty-six and Fehling's solution was reduced. The Wassermann reaction was negative and cultures were sterile. There was no web. A second puncture, May 15, was again sterile. There was a moderate leukocytosis, varying from 12,000 to 18,000 with 80 per cent. polymorphonuclears. A nasopharyngeal culture showed *Bacillus influenzae*. The neurologic signs varied. She developed weakness of the muscles of mastication, tremor of the tongue with protrusion to the right, and then a right external rectus palsy.

About May 23, she began to improve markedly. Her mentality was much clearer, the tremor decreased, the tongue could be protruded normally, and the external rectus palsy was much less marked. The right arm reflexes were still increased, but the other reflexes were normal except for an atypical Oppenheim sign on the right side. The temperature became normal.

May 26, after getting up and walking about her bed without permission, she suddenly developed symptoms of pulmonary embolism and died in twenty minutes, twenty-six days after delivery.

Postmortem examination revealed thrombosis of both femoral veins and extensive bilateral pulmonary emboli, which occluded almost the entire pulmonary circulation. Macroscopically the brain was practically normal except for a few punctate hemorrhages on cut section in the region of the midbrain. The cerebrospinal fluid was normal in appearance and amount. Microscopic examination revealed the characteristic changes of lethargic encephalitis. There was congestion and slight round cell infiltration of the leptomeninges. There were marked perivascular infiltration and a few small hemorrhages about the vessels, especially of the midbrain and pons. There was no degeneration of the nerve cells. The medulla showed much less marked changes; the cerebral cortex was normal.

Clinical Notes, Suggestions, and New Instruments

ADMINISTRATION OF DIGITALIS BY "EGGLESTON METHOD"

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Many requests have been received for information as to the practical application of this method of administering digitalis, and therefore it seems advisable to publish a brief statement regarding the details involved. The reader is referred to the original paper¹ for the data on which the method is based, and to the papers by S. Marx White and R. Edwin Morris,² and by R. Edwin Morris,³ for comments on the method.

This method of digitalis dosage and administration is designed especially for rapid digitalization by oral administration. It depends on the establishment of an average total amount of digitalis which is required to produce full digitalization, or the minor toxic actions of digitalis. This total amount is expressed in terms of the activity of the drug and the patient's body weight in pounds. The activity of the drug is determined by the cat method of Hatcher,⁴ described in the *American Journal of Pharmacy*, the unit being the weight of dry drug, in milligrams, which is required to kill 1 kg. of cat when a solution is injected slowly and continuously intravenously. This amount is called a cat unit. High grade specimens of digitalis, when not assayed by the cat method, may be regarded as having an average activity of 100 mg. to the cat unit. The average total amount of digitalis required for oral administration to man is 0.15 of one cat unit per pound of body weight.

CALCULATION OF AVERAGE TOTAL AMOUNT

The calculation of the average total amount required by any given patient may be as follows:

1. The patient's weight is determined in pounds.
2. The cat unit of the digitalis is determined.
3. One of the following formulas is applied:

Formula I:
$$\frac{C. U. \times 0.15 \times W}{1,000} = \text{Grams of powdered leaf in total amount}$$

Formula II:
$$\frac{C. U. \times 0.15 \times W}{100} = \text{Cubic centimeters of tincture in total amount}$$

Formula III:
$$\frac{C. U.}{100} \times W = \text{Cubic centimeters of infusion in total amount}$$

In these formulas, *C. U.* is the number of milligrams in one cat unit, and *W* is the patient's body weight in pounds.

1. Eggleston, Cary: Digitalis Dosage, *Arch. Int. Med.* **16**: 1 (July) 1915.

2. White, S. M., and Morris, R. E.: The Eggleston Method of Administering Digitalis, *Arch. Int. Med.* **21**: 740 (June) 1918.

3. Morris, R. E.: Clinical Pharmacology of Digitalis, Minnesota Med. **1**: 125 (April) 1918.

4. Hatcher, R. A., and Brody, J. G.: The Biological Standardization of Drugs, *Am. J. Pharm.* **82**: 360, 1910.

The following example illustrates the use of these formulas: A patient weighs 150 pounds, and the digitalis available has an activity of 100 mg. to the cat unit. Applying Formula I for the powdered leaf, we have $100 \times 0.15 = 15$; $15 \times 150 = 2,250$; $2,250 \div 1,000 = 2.25 =$ grams of leaf in total amount. Applying Formula II for the tincture, we have $100 \times 0.15 = 15$; $15 \times 150 = 2,250$; $2,250 \div 100 = 22.5 =$ cubic centimeters of tincture in the total amount. Formula III gives $100 \div 100 = 1$; $1 \times 150 = 150 =$ cubic centimeters of the infusion in the total amount.

ADMINISTRATION OF AVERAGE CALCULATED TOTAL AMOUNT

1. When the patient has received no digitalis within the preceding ten days.

A. *In urgent cases.*—From one third to one half of the total calculated amount is administered at the first dose. After an interval of six hours, from one fifth to one fourth of the total is administered. After a second six hours, from one eighth to one sixth of the total is administered. Thereafter, if more digitalis is needed, about one tenth of the total may be repeated every six hours until maximal digitalization is secured. In the case of the example given above with the total amount being 22.5 c.c. of tincture, the first dose would be from 7 to 11 c.c.; the second from 4 to 5 c.c.; the third from 2.5 to 3.5 c.c., and thereafter about 2 c.c. every six hours if required.

B. *Rapid, for nonurgent cases.*—About one fourth of the calculated total is to be given at each of the first two doses, six hours apart. Thereafter about one tenth to one eighth of the total is given every six hours.

2. When the patient has been taking digitalis within the preceding ten days.

Before further digitalis is prescribed, the patient is to be subjected to the most careful examination, including the use of polygraphic or electrocardiographic records if available, to determine whether or not there are any evidences of digitalis action.

A. *When evidences of digitalis action are absent.*—The procedure is the same as outlined above, except that the total amount of digitalis required is to be reduced to 75 per cent. of the total calculated. Thus, in the example used the total would be reduced to 17 c.c. instead of the calculated 22.5 c.c., and the fractions prescribed at each dose would be based on the former figure (17 c.c.). The usual one tenth of the total every six hours may then be prescribed if necessary.

B. *When evidences of partial digitalization are present.*—

It is best not to attempt to administer more than one half of the total calculated amount of digitalis, divided equally between the first three doses. In urgent cases in this group, however, one may administer 75 per cent. of the calculated amount, preferably in three equal doses, and then if digitalization is not quite complete, one tenth of the total amount may be prescribed every six hours.

SAFEGUARDS

The appearance of one or more of the following criteria of adequate digitalization, or of minor digitalis intoxication, indicates the cessation of further administration, either permanently or temporarily:

1. Nausea or vomiting (except when due to splanchnic congestion and present before treatment is begun).
2. Fall of heart rate (not pulse rate) to or below 60 a minute.
3. Appearance of frequent premature contractions; of definite heart block; of marked phasic arrhythmia, or of coupled rhythm.

The observance of a six-hour interval between doses allows time for complete absorption of the preceding dose and the development of its full action on the heart so that if the patient is examined just before the administration of each dose, dangerous intoxication can be absolutely prevented. In practice it is perfectly safe to give the first three doses without personally examining the patient before the second and third doses if the one nursing the patient is properly instructed to look for nausea, vomiting, or slowing of the pulse to 60 or less a minute before giving the succeeding dose, and to stop administration if any of these phenomena appear.

When a leaf, tincture, or infusion the cat unit of which is unknown is employed, 100 mg. may be taken as the cat unit; but not more than 75 per cent. of the calculated total amount should be given in the first three doses.

When the patient cannot be weighed, or when marked edema or general anasarca is present, the body weight (exclusive of edema fluid) must be estimated as closely as possible and the total amount of digitalis calculated as usual. Not more than 75 per cent. of the calculated amount should then be given in the first three doses.

COMMENT

The employment of this method of administering digitalis is without danger to the patient if the directions are followed in detail and if the safeguards are carefully observed. By its employment it is usually possible to produce maximal digitalis action in from twelve to eighteen hours, and marked therapeutic effects frequently appear within six hours after the initial dose. By its use it is possible to dispense with the intravenous or intramuscular administration of ouabain, amorphous strophanthin, or other digitalis body in the great majority of cases of heart failure.

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TRANSFUSION OF "ANTIBACTERIAL BLOOD"; REPORT OF CASE *

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M. K., a girl, aged 11 years, whom I first saw, Nov. 3, 1918, in consultation with Dr. Paul E. Wesenberg, had been suddenly seized with epidemic influenza, October 28. In a few days there was evidence of pneumonia at both bases. November 3 there was well marked consolidation on the right side posteriorly. A similar condition soon showed on the left, and by the 7th the patient gave signs of massive consolidation of both lower lobes. The case seemed hopeless. Oxygen was used freely; the windows were kept wide open. Moderate doses of morphin, with large doses of atropin, were being tried out at one of the army camps, in cases of massive influenzal pneumonia. The patient was given $\frac{1}{24}$ grain of morphin sulphate and $\frac{1}{50}$ grain of atropin sulphate every four hours for a day, and every six hours the second day. Morphin was then discontinued and atropin reduced to $\frac{1}{100}$ grain at four hour intervals, replaced after a day or two by 4 minims of tincture of strophanthus. Three grains of caffein sodiobenzoate were administered midway between the doses of atropin and strophanthus. Three grains of camphor in oil, and 5 minims of a 1:1,000 solution of epinephrin were employed hypodermically, as conditions warranted. Eliminative measures were freely used.

After a few days of treatment, the lung consolidation lessened and the child slowly improved. At the end of two weeks, râles at both bases were the only finding. In the meantime, however, there were other complications: an acute laryngitis; a dry pleurisy of the upper right chest, and a suppurative glossitis. November 12, swellings were noted on the back, right thigh and both ankles. The right ankle was incised on this date by Dr. Wesenberg, and pus was found. A blood culture was ordered, and mixed influenza serobacterin was administered for several consecutive days, without noticeable benefit. Dr. Horace Greeley reported the culture as showing a staphylococcus and a bacillus, the latter not identified. On account of the patient's extreme weakness, he doubted reaction to an autogenous vaccine, and suggested transfusion of blood from a donor whom the vaccine might cause to react.

An incision in the left popliteal space, November 15, revealed a quantity of pus. On the 17th, an abscess in the lumbar region was opened. A first injection of autogenous vaccine was given on this day. Two days later, incisions showing pus were made in the right side of the chest, left arm, left forearm and right hip. A considerable quantity of mucus in the stools gave evidence of an enteritis. November 20. Dr. Max Bender tested the blood of seven family

* Read in part before The Brooklyn Pediatric Society, Dec. 18, 1918.