a standardized Dare apparatus, since, initially, the figure was required only to obtain an approximate colour index figure. We propose to determine as accurately as possible in a series of cases the cell volume, hæmoglobin value, and cell-chloride value, to ascertain whether a definite relationship between hæmoglobin and chloride content of the cell can be demonstrated experimentally.

Summary of Results

Plasma chloride contents in the anæmias are constant.

Cell-chloride contents in pernicious anæmia (active and remission stages) are low.

Cell-chloride contents in the majority of cases of secondary anæmia tend to be above normal.

By Contrast

Plasma and cell-chloride contents are both lowered in diabetes mellitus and other conditions where increase of blood constituents requires osmotic compensation, and in acute intestinal obstruction.

The lowered cell-chloride content in pernicious anæmia is probably due to an osmotic adjustment to an increased cell-hæmoglobin content.

Our thanks are due to many of the attending physicians at the Winnipeg General Hospital for permission to examine patients, and especially to Dr. E. W. Montgomery for his continued interest and helpful advice during the course of the research.

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SOME OBSERVATIONS ON CHRONIC HYDROCEPHALUS WITH REPORT OF A CASE APPARENTLY ARRESTED

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ALL cases of chronic hydrocephalus are the end result of an excess in the amount of cerebro-spinal fluid secreted over the amount absorbed. This end result is the same whether secretion is normal, with lower than normal absorption, or whether it is abnormally increased while the absorption remains normal or nearly so. The results of surgical interference with the object of increasing absorption have not been very successful, and the procedures are often difficult and fraught with grave dangers for the little patients. Our surgical goal is to balance the secretion of cerebro-spinal fluid with its absorption. We are contending with a condition of too much fluid in the ventricles, and we can greatly decrease the amount of cerebro-spinal fluid secreted by the choroid plexus by ligating the two common carotid arteries. This comparatively simple operation if carefully done should not be hard on the little patient and will do much to restore the desired balance. The only dangers of this operation are shock and cerebral degeneration.

The Prevention of Shock

After ligation of one artery ten days should elapse before the other common carotid is ligated. The closing of the second vessel should not be done abruptly but very slowly, taking at least two minutes to completely stop the flow of blood. If it is done too abruptly, a fatal syncope may be precipitated.

When the ligation is completed the apparent shock is tremendous. The colourless lips, the alabaster pallor of the face, the more or less dilated pupils, the formerly pulsating, bulging fontanelle now motionless and the momentary cessation of breathing, complete the truly startling picture. This tremendous shock very

happily is only apparent, as the heart goes on undisturbed with practically no change in its rhythm, and the catch in the breath is but for a moment although the extreme pallor remains for many weeks.

The Prevention of Cerebral Degeneration

The cases of cerebral degeneration that have been reported following the ligation of a common carotid show it to have come on ten or twelve days after the operation. In these cases it could not have been due to the anæmia caused by the ligation (the period between ligation and onset is too long) but must have been due to an embolism from damaged endothelium in the artery.

Therefore, for a ligature use a good stout silk about No. 9 English (or if you prefer, a Perthe ligature) and tie it slowly, watching the distal pulsations in the artery, and tie it *only tight enough to stop these pulsations.* This will not damage the endothelium and any danger of embolism with its consequent cerebral degeneration is removed. To insure the ligation tie another ligature one-quarter inch proximal to the first.

Discussion

Researches would seem to indicate that cerebro-spinal fluid is secreted by the endothelium of the spinal canal as well as by the choroid plexus.[1] Some anatomists claim that in many normal individuals the foramen of Majendie does not exist.[2] In view of this, is it not possible that we overestimate the importance of the circulation of the cerebro-spinal fluid via this foramen?

We are endeavouring to bring the ratio of secretion and absorption of cerebro-spinal fluid to its normal level, so in all cases of chronic hydrocephalus obstructive and communicative (in other words congenital and acquired) I would advocate decreasing the amount of secretion by ligation of both the common carotid arteries. This, combined with aspiration of the ventricles or lumbar puncture for its immediate effect, and pressure bandages when indicated, should be the best and simplest method of treatment of these cases. If, after the common carotids have been ligated, the intra-cranial pressure increases or remains the same and shows no permanent decrease following an aspiration, one would be perfectly justified in ligating one of the vertebral arteries.

In justice to this procedure, I feel I should not close without referring to two conditions which, surgically at least, are very closely allied to chronic hydrocephalus, namely, the various cephaloceles and the various spinæ bifidæ. The end results of surgical interference in these cases is notoriously unsatisfactory because of the subsequent hydrocephalus. All such cases should receive the benefit of ligation of the two common carotids as a pre-operative measure before any surgical procedure is undertaken on the lesion itself. This will greatly enhance the chance of a cure. If after operation hydrocephalus follows despite this measure, the amount of cerebro-spinal fluid secreted being still too great, one of the vertebral arteries should be ligated.

Case Report

L. N., female, aged 9 months.

Family History.—Presents nothing of importance. Parents, two brothers and two sisters alive and perfectly normal.

Personal History.—Born in normal labour. Mother thinks the child had a large head at time of birth. Since that time it has been getting larger and the child at nine months cannot see, keeps rolling its eyes about and apparently does not hear well.

Physical Examination.—Fairly well nourished child with large head, twenty inches in circumference. Respiratory, digestive, cardio-vascular systems, etc., apparently normal.

Special Examination.—The head is twenty inches in circumference: fontanelles bulging and pulsating. Sutures are separated one-quarter of an inch. Baby cannot sit up and pays no attention to its surroundings. Head rolls helplessly from side to side. Eyes continuously moving aimlessly about. Pupils react to light. Under chloroform anæsthesia the discs are found to be much swollen, the veins being about four times as large as the arteries. Four c.c. of fluid were withdrawn from the left lateral ventricle by puncture through the anterior fontanelle and three c.c. of a 1 per cent solution of methylene blue were injected to replace it. One half-hour later a lumbar puncture drew off spinal fluid that was stained with methylene blue. Both blood and spinal fluid gave negative Wassermann and Kahn reactions.

Diagnosis.—Chronic obstructive hydrocephalus (congenital).

Treatment.—Ligation of the left common carotid artery was performed above the omo-hyoid muscle, and ten days later the right common carotid artery was ligated in a similar position.

Progress Notes.—Immediate recovery was uneventful. The pulsations of the bulging fontanelles stopped immediately. In 24 hours they were much softer and in 48 were not bulging at all. Nine months later the head was 20 inches in circumference and was held more or less erect. The fontanelles and sutures were closed. The eyes wandered at times but not at all to the extent they did before. The child saw objects placed three feet away and asked for articles of food such as cookies. It was able to crawl and could sit up alone. Eye grounds were apparently normal.

Two years later.—She is a well developed child whose

head while it looks perhaps a little large (21 inches) seems perfectly normal. She is able to walk about by holding on to window-sills and chairs, and takes a few steps alone. She sees and names objects placed before her, three or four feet away; for example, a knife, fork, spoon, apple, orange, etc., and the eyes very seldom wander. Mentally, for a child of two years and nine months she is more than normal in development. She can count up to twelve, repeat nursery rhymes such as "Rock a-bye baby on the tree-top", "Jack and Jill went up the hill," etc.; she can also sing songs and not only has the words correct, but keeps the tune in a truly surprising way. She is full of childish questions; can spell several words, such as dog, cat, cart, hen. In short she is an apparently normal child.

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AN ANALYSIS OF ULCER OF THE STOMACH AND DUODENUM

BASED ON A STUDY OF NINE HUNDRED AND FORTY-FOUR CASE REPORTS

BY RALPH LYNCH, M.D.

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IN the autumn of 1926, one of the senior physicians of the Montreal General Hospital, was called in consultation by a surgeon and an internist and was asked to give his opinion on the management of a duodenal ulcer patient, who had suffered two severe hæmorrhages within a period of 48 hours. The surgeon had raised the question of the advisability of immediately ligating the pancreatico-duodenal artery, as in his opinion the patient would not survive a third hæmorrhage. The internist demurred at such a radical procedure on the ground that the patient was too ill to withstand the ordeal of an operation.

The consulting physician favoured expectant treatment, and advanced the argument that in his experience, fatal hæmorrhage in duodenal ulcer, was unusually rare. To this, the surgeon responded that the severe hæmorrhage cases were usually admitted to the surgical side, and therefore escaped the observation of the medical department.

This controversy prompted us to look up the incidence of fatal hæmorrhage from peptic ulcer in the Montreal General Hospital. Having begun this investigation, we thought it worth while to make in addition to the studies of hæmorrhage, a general statistical analysis of gastric and duodenal ulcer. A study of this kind has not been made in comparatively recent years.

Included in this series are all cases diagnosed gastric, pyloric, duodenal or peptic ulcer, regardless of the service to which they were admitted. A clinician's diagnosis of ulcer, whether proved or not, was sufficient to place the case in this series. We realize that this is a rather inexact method of selection and doubtless, a number of these diagnoses are incorrect. However, if the series were restricted to ulcers proved at operation or autopsy, we could study only those cases in which medical or surgical treatment or both, had failed.

The hospital records for the ten year period, 1917 to 1926 inclusive, formed the basis of this analysis, and we wish to thank Drs. H. A. Lafleur, C. A. Peters, A. H. Gordon, E. M. Eberts, A. T. Bazin, and others of the Montreal General Hospital Staff, for permission to use their cases.

INCIDENCE

In a total of 64,917 admissions, there were 944 cases of ulcer; a frequency of 1.45 per cent. At the Montreal General Hospital in 1904, the incidence was 0.88 per cent. Howard[1] in 1904, reported the figures from 15 hospitals in the United States and Canada, and showed an average incidence of 0.57 per cent.

These older figures are not comparable, however, for duodenal ulcer was almost an unknown quantity at that time, and the incidence given, was almost exclusively that of gastric ulcer. Of the 944 cases 690 or 73 per cent were males, while 254 or 27 per cent were females.