showing retardation of thought, drowsiness, mild disorientation, and slow response to questioning. Objective signs were present in 10 cases of this type, and included nystagmus, pupillary dilatation with sluggish reflexes to light, diminution of vision, cerebellar ataxia and dysarthria, and loss of vibration and position sense. Centrally, therefore, the main incidence seems to be on the optic nerves, oculomotor nerves, cerebellar connexions, and posterior columns, with occasional involvement of the higher centres producing psychic disturbances.

Treatment up to the present has been only symptomatic, as these cases improve with rest in bed and removal from exposure to the gas, and no great increase in blood or cerebrospinal fluid bromide has been found (up to 27 mg. of sodium bromide per 100 c.cm.). It is presumably the methyl combination that does the damage, as bromide poisoning is not clinically apparent until blood concentrations of above 100 mg. per 100 c.cm. are reached.

Convalescence is prolonged, with persistence of some ataxia, undue fatigue, and nystagmus long after the disappearance of the peripheral neuritis, but most of the cases seem to have recovered within a year. Two patients were returned to employment where the risk of exposure to methyl bromide was still present, and both relapsed within six months and had lost time from work owing to residual and recrudescing symptoms.

Summary

The effects of chronic methyl bromide poisoning on the nervous system are described, with a review of the literature and an illustrative case history.

These effects, on analysis, form a pattern of dysfunction mainly affecting the peripheral and optic nerves, cerebellar connexions, and certain spinal cord tracts, although the material available is not sufficient to postulate a definite syndrome associated with methyl bromide poisoning.

On removal of the patient from the toxic hazard the symptoms slowly clear up without any specific treatment and apparently without permanent sequelae, but it is inadvisable to allow return to further exposure.

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HYPOPROTEINAEMIA DURING RECOVERY FROM SEVERE ANAEMIA

BY

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Generalized oedema due to diminution of the serum proteins is not a common complication of the treatment of anaemia and does not occur unless the ingestion of protein is low during the period of regeneration of haemoglobin. It is not generally recognized that the formation of haemoglobin makes great demands upon the protein reserves of the body. Heath and Taylor (1936) state that for a gain of each 10% of haemoglobin about 80 g. of protein is required and that haemoglobin formation is accompanied by a positive nitrogen balance only when the diet contains more than 6.2 g. of nitrogen a day. They say, however, that haemoglobin formation takes place at a normal rate even in the face of a negative nitrogen balance, and that in these circumstances the demand for nitrogen for haemoglobin formation appears to be supplied by tissue and plasma proteins.

The case described below is one of severe nutritional oedema following the treatment of pernicious anaemia. Faulty dietetic

habits had been present for years, and they were not fully corrected during the period in hospital preceding the onset of the oedema.

Case Report

The patient, a married woman aged 49, was admitted to hospital on June 13, 1944. She complained of increasing lassitude and loss of weight over a period of a few years. She stated that she had lost about 4 st. in the past 18 months. She had suffered from dyspepsia most of her life, and often vomited if her food "disagreed" with her. Her appetite had become very poor, and she existed mainly on a soft carbohydrate diet, rarely eating meat. She had had occasional diarrhoea during the past four years. The climacteric occurred early in 1944. There was no history of any previous severe illness.

On examination the patient was very emaciated and pale. The skin had a faint yellowish tint, but she had a malar flush. Her hair was thin and lustreless, and her general appearance suggested a mild degree of pituitary cachexia rather than pernicious anaemia. The tongue showed slight atrophic glossitis, but there was no koilonychia. She had a tachycardia of 100 a minute, but the pulse was regular and of good volume. B.P. 120/75. The heart was slightly enlarged, but there were no murmurs. Examination of the chest revealed no abnormality, and there were no abnormal neurological signs.

A blood count revealed a macrocytic anaemia. Red cells, 1,600,000 per c.mm.; Hb, 35%; C.I., 1.13; white cells, 7,500 per c.mm. A fractional test meal showed complete achlorhydria. A glucose-tolerance test gave normal figures, and the Wassermann reaction was negative. Radiological examination of the alimentary tract by barium meal and enema revealed no abnormality.

Treatment with liver extract, ferrous sulphate, and vitamin B complex was begun, and the haemoglobin and red cells increased steadily, with a maximum reticulocyte response of 10%. On July 7 a painful thrombophlebitis occurred in the left saphenous vein, and a week later a similar condition occurred in the right saphenous, both accompanied by oedema of the leg. The inflammation and oedema subsided quickly, however. On Aug. 9 the haemoglobin was 76% and the red cells 3,700,000 per c.mm. The patient felt very much better and lost her feeling of lassitude, but she could not be induced to eat the full hospital diet. She constantly refused meat, but ate moderate quantities of carbohydrate foods. On Aug. 11 gross oedema of the legs, abdominal wall, and trunk appeared, almost overnight. Ascites was present; but the oedema of the trunk finished abruptly at the mid-dorsal level—none was seen in the arms or face. There was no pain or pyrexia and the urine was normal. No pleural effusions were present, but moist sounds were heard at both lung bases. The urinary output was small (15 oz. in 24 hours). The serum proteins were low: total protein, 4.16 g. per 100 c.cm. (albumin 1.8%, globulin 2.36%); serum sodium, 346 mg. per 100 c.cm.

On Aug. 16, 80 g. of protein in the form of reconstituted plasma was given intravenously by slow drip and the patient was persuaded to eat a high-protein diet. Almost immediately a marked diuresis resulted, the urinary output often exceeding 80 oz. a day during the next three weeks, during which time the oedema almost completely disappeared. On Aug. 20 the total serum proteins had risen to 5.25%, the diuresis was still being maintained, and the oedema was steadily diminishing. On Sept. 8 the patient was out of bed and felt quite well. Very slight oedema of the feet was present, but this was probably attributable to the thrombophlebitis. The serum proteins at this date were: total protein, 5.61% (albumin 3.36%, globulin 2.25%). The liver treatment was maintained and the haemoglobin had risen to 80%. She was discharged from hospital on Sept. 23.

Comment

The above case illustrates the importance, during the treatment of severe anaemias, of maintaining a diet rich in protein so as to provide the excess of protein necessary for haemoglobin regeneration. If protein intake is inadequate the depletion of the reserves of stored protein may not become evident until a considerable amount of haemoglobin has been formed. As stated before, in order to prevent this depletion a daily intake of more than 6.2 g. of nitrogen available for protein formation is necessary. Inadequate intake of nitrogen owing to a psychological distaste for food appears to have been the main factor in the causation of the protein deficiency in this case, but it is interesting to speculate that the fatty degeneration of the liver which occurs in pernicious anaemia may have impaired the hepatic synthesis of tissue protein and that the hypoproteinaemia may to some extent have been "hepatic" as well as "prehepatic."

The treatment of clinically severe states of hypoproteinaemia with gross oedema is a matter of some urgency. When the deficiency is of the "prehepatic" type, due to inadequate

alimentary intake of protein, it is an advantage to supplement an increase in orally administered protein by parenteral therapy. The transfusion of plasma is a convenient method. It was used with success by Holmes (1944) in a similar case of hypoproteinaemia following the treatment of a microcytic anaemia in a vegetarian. Large amounts of plasma may be needed to treat severe protein depletion. The actual amount used in a given case must be judged by the clinical response in the form of diuresis and reduction of oedema. In this case and in Holmes's a moderate amount of plasma was given intravenously to initiate diuresis, and the complete restoration of protein was obtained by an increase in the oral intake.

Recently the intravenous infusion of amino-acids has been suggested by several American workers (Elman, 1940; Shohl *et al.*, 1939; Farr and MacFadyen, 1939; Brunschwig, Clark, and Corbin, 1942). The material used was a hydrolysate of casein; but this is difficult to prepare in a state suitable for intravenous infusion, and unpleasant reactions are said to occur. In "prehepatic" types of hypoproteinaemia the intravenous infusion of amino-acids would appear to have no clinical advantages over plasma transfusion. If plasma is not available whole blood could be used. The casein hydrolysate containing essential amino-acids should be a useful preparation for oral administration, however, particularly in nutritional deficiency of psychological origin.

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Medical Memoranda

Gastric Drip Infusion to Combat Dehydration in Infants

In the treatment of neonatal sepsis the outlook is at present largely determined by whether or not the causative organism is sulphonamide-sensitive; whereas in future it will be a question of whether or not it is penicillin-sensitive. But besides this there will always remain the problem of how to relieve the dehydration.

Of the methods at present in common use each has its drawbacks. It is rarely possible to administer enough fluid by the subcutaneous route to overcome the dehydration in a seriously ill infant; besides which there is the danger of introducing another portal of entry of sepsis. The intraperitoneal route is inclined to be accompanied by considerable shock to the baby and is not without risk. The rectal route is usually impracticable owing to diarrhoea. By the intramedullary and intravenous routes it is always possible to give enough fluid; but unfortunately it is all too easy to give too much. This is especially so in babies, where the kidney and heart can be so easily overloaded and where pneumonia is so great a danger. Unfortunate accidents with the intramedullary method have been recorded, therefore we always attempt an intravenous drip first; and though it is fairly rare to be unable to get an intravenous drip running it is a difficult and time-consuming procedure.

In view of all these objections we began in August of this year to try the effect of a continuous drip into the stomach or the lower end of the oesophagus. It is neither an original nor a new technique, but having found it most successful we suggest that it should be more widely known and used in overcoming dehydration. We found that it was easily possible to give to a neonatal baby up to forty ounces of fluid in the day. On the other hand, compared with the intravenous route, the danger of overloading the circulation is greatly diminished. Another advantage is that it is a means of enteral medication and of gradually changing the composition of the fluid. The technique is simple, and a gastric drip can be erected in a few minutes by a competent nurse.

At present our routine is as follows. In any case in which there is severe dehydration a gastric drip is erected. If there has been much vomiting sterile water or normal saline is given in the first instance, and then this is replaced by albuminous fluids such as "secway" or egg-white. It is usually possible to relieve dehydration in one day, but if necessary the drip can be left *in situ* for much longer, provided that the tube is removed every twenty-four hours and the whole apparatus resterilized. The flask, clip, rubber tubing, and drip chamber are the same as for blood transfusion, the rubber tubing being joined to a fine (No. 5) rubber catheter by a glass connexion. The tube is passed through the nose, as we find this less irritating to the baby. It is kept in the required position with strapping on the forehead. The infusion fluid is warmed before

placing in the flask and is kept warm by running the tube over a hot-water bottle, which requires frequent changing.

While originally introduced merely as a means of relieving dehydration, it occurred to us that it might at times be a useful method of feeding in weakly or dull babies such as those who are immature or jaundiced. It might have been thought that vomiting would make the technique impossible; but, on the contrary, we have found it a means of stopping even most persistent vomiting. It is very rare for a baby to vomit at all while the gastric drip is running, and we have never had to stop one for this reason. Another possible danger was the production of an oesophagitis, but in the very few cases as yet seen at necropsy this has not been found.

The following cases illustrate the uses of the method.

1. Infant S. Twelve days old on admission to sick nursery, 1 lb. 2 oz. below birth weight. Severe vomiting and diarrhoea. Baby looking moribund. Gastric drip started. Sulphamezathine tab. 1/4 q.q.h. and pulv. kaolin sii q.q.h. Drip continued for three days, during which time the fluid was gradually changed from saline to "secway" and then to human milk. When weighed on the fourth day it had gained 7 oz. Vomiting had stopped, the motions were normal, and it made a steady recovery.

2. Infant B. Ten days old. Admitted to sick nursery with diarrhoea and vomiting, 1 lb. below birth weight. Sulphamezathine tab. 1/4 q.q.h. and pulv. kaolin sii q.q.h. On account of dehydration put on gastric drip of "secway" for 24 hours. Gradually increased to 2-in-1 cow's milk-water mixture. Nine days later discharged 1 oz. over birth weight.

3. Infant J. Four days old on admission to sick nursery. Very persistent vomiting, even of saline. Marked dehydration. Found to have very inflamed ear-drums. Sulphathiazole tab. 1/4 q.q.h. given. Gastric drip of saline started. No further vomiting. Dehydration relieved. Ears cleared up. Made steady recovery.

4. Infant R. Birth weight 3 lb. Extremely weakly. Fed for one week with gastric drip, during which time it lost only 2 oz. It was then strong enough to be fed from a bottle. It is now 7 weeks old and weighs 4 lb. 12 oz.

In conclusion we would say that for safety, simplicity, and effectiveness in the relief of dehydration we find the gastric drip excellent, and think that its more frequent use in neonatal and infant nurseries would save lives, time, and anxiety.

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Urinary Retention in an Infant caused by Malignant Growth

Acute retention is not a common complaint in infants. The following case occurring in a baby girl of 6 months may therefore be of interest.

CASE HISTORY

The infant was well developed and had had no ailments until a week before her admission to hospital. The doctor had been called in because the child was in obvious pain and had not passed urine that day. The bladder was distended, and about a pint of urine was withdrawn through a catheter. Catheterization had to be repeated daily for a week.

On admission to hospital a fine rubber catheter was passed quite easily and tied in to drain the over-distended bladder and allow it to recover its muscular tone. After seven days' continual drainage the catheter was removed and for three days normal micturition occurred. It was noticed during this time that the baby was constipated and often became distended with wind. Retention of urine became acute again on the fourth day after removal of the catheter, and so a general anaesthetic was given to allow of a complete examination and to insert a suprapubic self-retaining catheter.

Rectal examination revealed a large, smooth, rounded swelling arising from behind the rectum, lying in the hollow of the sacrum and almost completely filling the pelvic cavity. It was solid, moderately hard in consistence, and about the size of a Jaffa orange. It was hardly possible to insinuate the finger between the tumour and the symphysis pubis. An unsuccessful attempt to aspirate its contents confirmed the solid nature of the tumour. From the abdominal aspect nothing was visible or palpable.

A week later, although urine was draining freely through the suprapubic catheter, it was apparent that intestinal obstruction was becoming more severe. Laparotomy was decided upon with a view to determining the nature of the tumour, seeing if it could be removed, and if not, then relieving the obstruction by colostomy. Through the abdominal incision it was found that the tumour filled the true pelvis almost completely. The rectum and pelvic colon were pushed forwards and to the left, and the latter was compressed at the level of the pelvic brim. The posterior parietal peritoneum (which was intact) was incised to the right of the pelvic colon and by blunt dissection the tumour was separated posteriorly down as far as the middle of the sacrum without much difficulty. Lower down it was firmly adherent to the bone, and it became obvious that it could not be removed. A small section was taken for biopsy. Little or no haemorrhage was encountered. Sudden collapse necessitated the rapid termination of the operation, and the baby died before it could be returned to the ward.

The pathological report, for which I am indebted to Prof. M. J. Stewart and Dr. R. M. Heggie, was as follows: "This is a highly malignant and embryonic teratoid growth arising from the intermediate cell mass. It is essentially adenocarcinomatous in nature and papillary in type. The exact origin cannot be stated."

Skipton.

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