NUTRITIONAL OEDEMA IN A VEGETARIAN

BY

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Nutritional oedema has long been recognized as an accompaniment of gross disease of the alimentary tract and of conditions which lead to excessive loss of plasma proteins. It is commonly seen in conjunction with chronic dysentery and other conditions giving rise to chronic diarrhoea. It may be accompanied by symptoms of vitamin deficiency, such as peripheral neuritis or pellagra, and an anaemia of microcytic or macrocytic type is often associated with it.

The chief factor in the causation of nutritional oedema is generally considered to be a hypoproteinaemia, with a consequent lowering of the osmotic pressure of the blood and a disturbance of the balance of fluid distribution between the blood and the interstitial tissue spaces. Moore and van Slyke (1930) state that oedema develops when the total serum proteins fall below the critical level of 5.5 ± 0.3 g. per 100 c.cm.; but other factors, such as the intake and excretion of blood electrolytes, the blood volume, and the presence or absence of anaemia, must also influence the occurrence of oedema, so that it does not necessarily appear when the serum protein content falls below the so-called critical level.

In the absence of gross alimentary disease nutritional oedema is rare in this country, and even vegetarians are able to maintain an adequate protein intake, in spite of wartime restrictions in diet. The case to be described, however, illustrates how a vegetarian diet in association with a comparatively minor gastro-intestinal abnormality may cause a hypoproteinaemia of serious degree, giving rise to symptoms similar to the "hunger" or "famine" oedema which occurred epidemically in Europe during the last war and which will no doubt occur again during this war.

Case Report

The patient, a woman aged 61, was first seen in consultation with Dr. B. A. Abbott, of Rugeley, on Aug. 3, 1943. During the previous few weeks Dr. Abbott had treated her for a severe anaemia by ferrous sulphate and small doses of liver extract intramuscularly. Although the anaemia had practically disappeared she had developed ascites and generalized oedema during the preceding ten days. In 1932 a gastro-enterostomy had been performed for pyloric stenosis due to a chronic ulcer, but no gastric symptoms had occurred since and her health had been good until the onset of the anaemia. She stated that she was an almost complete vegetarian, the only animal foods taken being milk and cheese. For the last eight weeks her appetite had been poor and her intake of milk had been low owing to rationing.

On examination she was pale but not grossly anaemic. Her skin was dry and had a slightly atrophic appearance. She had a red glazed tongue, sore at the tip, and her finger-nails showed a well-marked koilonychia. Gross ascites and a generalized oedema of the whole trunk were present, but oedema was only slightly evident in the face. There was some dyspnoea, and signs of free fluid were observed in both sides of her chest. The pulse rate was 100 per minute, but there was no cardiac enlargement or irregularity. B.P. 140/90. The urine was normal, containing no albumin or casts. Her mental state was normal, and she showed no neurological abnormality. There was no diarrhoea, and the stools were normal in appearance.

She was admitted to hospital for further investigation on Aug. 5. A diagnosis of nutritional oedema had been considered, but the possibility of gastric carcinoma with widespread secondary deposits had to be excluded. Investigations produced the following results: Blood count: R.B.C., 3,900,000 per c.mm.; Hb, 72%; C.I., 0.92; W.B.C., 10,200 per c.mm.—polymorphs 76%, lymphocytes 21%, monocytes 3%; slight anisocytosis and poikilocytosis of red cells. Total plasma proteins: 3.3 g. %—albumin 1.98%, globulin 1.32%. Serum sodium 313 mg., serum calcium 8.1 mg., and blood pyruvic acid 0.77 mg. per 100 c.cm. Fractional test meal: complete histamine-fast achlorhydria, with emptying time of $1\frac{1}{2}$ hours. Pleural fluid: 46 lymphocytes per c.mm.; protein 240 mg., chlorides 620 mg. per 100 c.cm. An x-ray film of the chest showed large bilateral pleural effusions. Radiological examination of the stomach and intestinal tract revealed no abnormality apart from the gastro-enterostomy. During the first four days in hospital her urinary output was low, averaging about 600 c.cm. a day, without restriction of fluid intake. She continued her vegetarian diet during this time.

On Aug. 10 the patient was given two bottles of reconstituted plasma intravenously. On the 11th it was noticed that her urinary output had risen to 1,800 c.cm. during the 24 hours and her total plasma proteins to 4 g. %—albumin 2.66%, globulin 1.34%. Two more bottles of reconstituted plasma were given on the 12th, and she was persuaded, with some difficulty, to take a high-protein diet containing ample amounts of animal protein. During the next week the high urinary output was maintained and there was a rapid diminution in the ascites, generalized oedema, and pleural effusions. Her further progress was uneventful, and the ascites, oedema, and pleural effusions had disappeared completely in about ten days. Oral and intravenous glucose-tolerance tests were done on Aug. 14 and 15 respectively, and showed no disturbance of sugar metabolism. She has remained well up to the time of writing, having abandoned her vegetarian diet.

Comment

Hypoproteinaemia has been classified by Davis and Getzoff (1942) into three types: (1) *Prehepatic hypoproteinaemia*, in which there is interference with adequate intake, digestion, or absorption of plasma-protein building materials. In this type the ability of the liver to form plasma protein is not affected. (2) *Hepatic hypoproteinaemia*, in which there is inability of the liver itself to form plasma proteins, in spite of the fact that normal supplies of protein building material are received from the intestines. This type is usually associated with severe hepatic disease. (3) *Post-hepatic hypoproteinaemia*, in which there is an adequate formation of plasma proteins by the liver, but an abnormal loss of plasma protein, as in severe burns or prolonged haemorrhage or suppuration.

The case described was of the "prehepatic" type. The patient's vegetarian diet contained a minimal amount of protein, and when her appetite was poor her protein intake was further reduced. The complete achlorhydria no doubt interfered with adequate digestion, and so the plasma proteins fell below the level required to maintain the normal osmotic pressure of the blood. The achlorhydria also interfered with her iron intake and produced an iron-deficiency anaemia.

The treatment of severe degrees of nutritional oedema by a high-protein diet alone may be slow, and it seems reasonable to expect a more rapid response from intravenous plasma transfusions. This expectation was well borne out by the immediate increase in the urinary output after the first plasma transfusion and the rapid disappearance of the oedema.

REFERENCES

- Moore, N. S., and van Slyke, D. D. (1930). *J. clin. Invest.*, **8**, 337.
Davis, H. A., and Getzoff, P. L. (1942). *Arch. Surg.*, Chicago, **44**, 1071.

Medical Memoranda

The Use of Cyclopropane in the Field

Shortly before the second battle of Alamein I received, through the co-operation of the D.M.S., M.E.F., Major-General Sir Percy Tomlinson, A.M.S., and the Technical Adviser in Anaesthetics, M.E.F., Major R. W. Cope, R.A.M.C., a cylinder of cyclopropane for use in the forward areas. Since then I have had a small but adequate supply, and I have used it at a C.C.S. during the Eighth Army's advance almost to the end of the campaign, at a field surgical unit for the Sicilian campaign, and also for four months in Italy, from the landing at Salerno onwards. I think it is now possible to make some assessment of the value of cyclopropane for the type of case operated on in casualty clearing stations and field surgical units.

Approximately 1,200 cases were anaesthetized by me during this time. Pentothal alone was the drug used in 80% of the cases; cyclopropane, with or without the addition of nitrous oxide or occasionally ether, in 10%; local anaesthesia in 5%; and intravenous morphine in 5%. The cyclopropane was reserved for the penetrating wounds of the abdomen, the thoraco-abdominal wounds, and those few cases which were regarded as very bad risks and had failed to respond to resuscitative measures. It was found to be of great value in all these cases.

THE PROCEDURE

Penetrating Wounds of the Abdomen.—Most cases were already adequately morphinized, and no further premedication was given. They almost all came to the theatre with a slow blood drip going, and induction was usually effected by injecting 0.25 g. to 0.5 g. of pentothal. Intubation was done as a

routine in the early cases, but later it was found that many cases could be managed perfectly well without, and it was only done in those that presented special difficulties. The ease of control of the depth of anaesthesia, the quiet respirations, and the good oxygenation were features that were appreciated. No difficulty was experienced in obtaining adequate relaxation. Patients recovered quickly after operation, and their cough reflex was usually present before they left the theatre.

Thoraco-abdominal Wounds.—The same procedure was followed in these cases, except that intubation was done as a routine. Controlled respiration was used when necessary.

The Very Bad Risks.—Anaesthesia in these cases was effected with nitrous oxide and a high percentage of oxygen. Cyclopropane was added if necessary.

General.—The machine used was a Rochester Lundy Heidbrink. It has travelled many hundreds of miles over bad roads and tracks, and has been packed and repacked many times without damage. Two hundred and seventy gallons of cyclopropane have been used for 120 operations. The economy in cylinders thus effected is most striking. If semi-closed nitrous oxide, oxygen, and ether had been used in these cases about 120 100-gallon cylinders of nitrous oxide would have been required instead of the three cylinders of cyclopropane of the same size.

CONCLUSIONS

Cyclopropane was found to be of great value for penetrating wounds of the abdomen, thoraco-abdominal wounds, and bad risks.

A modern anaesthetic machine will stand up well to the constant moves and rough usage encountered in the field.

The economy in material effected by the use of the carbon dioxide absorption technique is demonstrated.

It must be emphasized that the circumstances which enabled me to be supplied with cyclopropane were unusual and that difficulties of supply would preclude its use on a large scale.

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Expectation of Life after Nephrectomy for Urinary Tuberculosis

The following cases which reported to me simultaneously last Christmas may be of use to those who are asked for prognosis in urinary tuberculosis:

CASE HISTORIES

Case 1.—A lady was sent to me from Singapore 45 years ago with a grave prognosis of urinary tuberculosis. The presence of tubercle was confirmed. On cystoscopy I found the right ureteral orifice dragged away from its angle in the trigone, and recognized that I was dealing not with a vesical tuberculosis but with tuberculosis of the right kidney and ureter. I removed the right kidney, which proved typical of the disease, but left the lower part of the thickened right ureter. This lady has reported yearly to me since then. She has married twice, and the son born subsequent to the operation joined the R.A.F. She is now 70, and though feeling the limitations of her age, is happy, free from pain, and moderately active.

Case 2.—Twenty-seven years ago I was consulted about an abdominal attack in a male case which I diagnosed as being due to disease of the appendix. The right epididymis was tuberculous and suppurating, and the patient had a small hard deposit of tubercle in the right prostatic lobe. On opening the abdomen I found the appendix normal, but the entire peritoneal surface was subacutely inflamed and the mesenteric glands were very large and obviously inflamed. I closed the abdomen without drainage. As the patient had tubercle bacilli in the urine, and cystitis, I gave a very grave prognosis; but he recovered, healing normally. He went to the South of France, and after a year or so (1920) my friend Prof. Wildbolz of Berne removed his right kidney. Later on he had cystotomy performed in Mentone and an "ulcer at the neck of the bladder scraped." Eventually he returned to London, and Sir J. Thomson-Walker punched out with a cupping forceps the deposit in the right prostatic lobe. This patient reports to me frequently. He is now 70, very active and without urinary symptoms, and able to enjoy life and take part in the social activities of a large provincial town.

Here are two cases of confirmed urinary tuberculosis, both pointing, I suggest, to the renal origin of the disease, and both relieved by removal of the focus in the kidney.

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Reviews

FEEDING BRITAIN

Achievement in Feeding Britain. By Gerald Bullett. (2s. 6d.) London: Pilot Press.

This is No. 5 of the "Achievement Books" which the Pilot Press are publishing. The series is under the general editorship of Mr. Noel Carrington. In his short foreword to this book Mr. Carrington says—truly enough—that the health of the nation has not only been maintained but in many instances actively improved during this war, in spite of severe rationing. Here the overworked general practitioner ironically comments: "In many instances, yes; but in many more instances the boot is on the other foot." Mr. Carrington, however, resuming his exordium, says: "So perhaps we should not only thank God with our daily grace before and after meals but occasionally pay a tribute to the almost miraculous work of those responsible for bringing us our rations—the seamen, the farmers, the dockers, the railway men, the shopkeepers; and, behind them all, the staff of the Ministry of Food." The suspicion of the cynical reader grows, in spite of the truth, justice, and good feeling of every sentence that Mr. Carrington writes—taking exception, possibly, to his grammar. But, to resume. Like the other works issued by the Pilot Press this is well printed, on good-quality paper, and is illustrated on every page by one or more photographic reproductions, including several in colour, practically the whole of the photographs being supplied by the Ministry of Food—the hero of the book. The illustrations are most varied, though one misses a portrait of the author himself, who, after all, does the real work of this brochure. Still, nearly everything else is illustrated. There is a very nice portrait of a thrush dropping grubs into the wide-open mouths of its tiny nestlings, in their natural surroundings; while other pictures show a meeting of the Scientific Advisory Committee with Sir J. C. Drummond at the Ministry of Food; a land girl leading a bull to fresh quarters; miners and their families working on their allotments outside the pit-head; and a civic restaurant at Kingston with customers seated at the tables and the walls decorated by young artists. We have a photograph of the King studying a chart with Lord Woolton at headquarters, and one showing the contrast of "potatoes in plenty in 1943" with potatoes in scarcity in 1917. Lord Woolton has been called upon to preside over a difficult enterprise in which few men would have succeeded one-tenth as well as he has—thanks largely to his wise choice of scientific and other advisers, and his wisdom in knowing when wholly to follow their advice, when to follow it subject to modifications, and when to reject it altogether. But we must remember that "even Homer nods," even Socrates made mistakes, and the wisest doctor whom Harley Street has ever produced occasionally finds his diagnosis and prognosis disproved in the pathological laboratory and the post-mortem room. And the Minister of Food must not be confused with the Ministry of Food; nor must either be confused with "the Government."

One thing, however, is certain. Whoever is responsible for the choice made no mistake in getting Mr. Gerald Bullett to write this summing-up of the facts put before him. Mr. Bullett is known to a large part of the educated world as a poet of distinction and one of the finest and most tasteful of anthologists, his only serious English rivals being Sir John Squire, the Viceroy of India, "Q," G. K. A. Bell, and the Secretary of the Society of Authors. This gives considerable authority to any work of this kind that he may undertake; and we can be quite sure that, like Lord Woolton himself, he will obtain his facts from the best-reputed and most authoritative sources, and that he will bring both taste and common sense to the summing-up of these "scientific statements." Of course, even after all this care has been taken and this pictorial splendour has been laid before us, many of us, not the most thoughtless or nationally insoucious, will occasionally raise our eyebrows and think twice before swallowing everything holus-bolus. Here, for instance, are a few memories of my reading and observation that give occasion for pause.

J. C. McClelland (*J. Urol.*, 1944, 51, 1944) records the case of a man aged 42 who was given sulphathiazole gr. 30 and sulphapyridine gr. 150 for acute otitis media in 48 hours. He developed anuria and died early on the seventh day. The pathological findings were not marked, nor did they seem to be sufficient to cause anuria and death. The ureters were not blocked with crystals.