A CASE OF POLYCYTHAEMIA RUBRA DEVELOPING ANAEMIA

BY

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The case to be described is one of polycythaemia rubra, apparently typical, in which achlorhydria was present, and the patient, after giving blood on thirty-nine occasions as a donor, developed a considerable degree of anaemia with a low colour index, but with typical glossitis, which improved rapidly on liver treatment. He was subsequently found to have a positive Wassermann reaction, although he denied all possibility of syphilis. After anti-syphilitic treatment the Wassermann reaction became negative. He has now given up taking liver, and is practically *in statu quo*, showing typical polycythaemia and no anaemia or sore tongue. Examination of the nervous system has been negative throughout, though there was some "tingling" of the fingers during the anaemic period. The spleen and liver have been enlarged from the commencement.

Freund¹ in 1919 described a patient who died of anaemia (? aplastic) after having had polycythaemia. Strangely enough, this patient also showed a positive Wassermann reaction, definitely admitted syphilis, and developed an aortic aneurysm. Freund also mentions a case described by Schneider in which polycythaemia progressed into anaemia after splenectomy. The reference is not given. Minot and Buckman² have recorded three cases of polycythaemia developing anaemia. In none of these is any note made of the gastric acidity or the state of the tongue.

The question arises as to whether, in the case here recorded, there was a real syphilitic infection, or whether the strange blood condition can have affected the validity of the Wassermann reaction. The recipient of the blood on the last occasion that it was used for transfusion purposes (on the day that the positive Wassermann reaction was discovered) is alive and well, and has shown no sign or symptom of syphilis. The case also illustrates the value of frequently repeated venesection in polycythaemia, as this patient has worked and remained comparatively well for over four years.

CLINICAL HISTORY OF CASE

The patient, a commercial traveller, aged 47, married, was admitted to the Royal Infirmary under Dr. Yates on January 10th, 1927. He had been healthy until a severe attack of influenza in 1918, six months after which he noticed occasional aches and pains, tiredness, headaches, and redness of the face and hands. During the last ten weeks before admission the symptoms had become worse; dyspnoea and swelling of the ankles had appeared. The family history was negative. His wife had had three healthy children, and had had no miscarriages.

On examination he presented a typical appearance of polycythaemia rubra. The heart was enlarged, systolic blood pressure 130, spleen palpable as far down as the umbilicus. Though there may have been some slight emphysema, there was no thoracic condition serious enough to have caused a secondary polycythaemia. Examination of the nervous system showed nothing abnormal.

The Wassermann reaction was negative on two occasions. The blood count on admission showed: red cells, 10,000,000 per c.mm.; haemoglobin, 140 per cent.; colour index, 0.7; white cells, 17,000 per c.mm.—polymorphs 88 per cent., eosinophils 0, basophils 1, lymphocytes 11, hyalines 0. There was occasionally a trace of protein in the urine.

He was treated by x-ray exposure to the spleen and long bones, and was discharged on February 28th, 1927, slightly improved (haemoglobin 125 per cent.).

In September, 1927, he offered himself as a blood donor for transfusion purposes, and tests showed that he belonged to Group IV (Moss), and that the Wassermann reaction was again negative. Between September, 1927, and May, 1931, he gave blood on no fewer than thirty-nine occasions. He stated that he always felt better after venesection, and that if he did not give blood for five or six weeks the heavy, full sensations in the head and limbs returned. Apart from a small venous thrombosis in the neighbourhood of the right ankle, he remained well and working until May, 1931. A blood count on April 10th, 1930, showed: red cells, 7,150,000 per c.mm.; haemoglobin, 110 per cent.

On May 13th, 1931 (one month after a venesection), it was noticed that he was paler than before, and he remarked that he had for several months been troubled with a sore tongue. The tongue showed the typical appearance of chronic superficial glossitis as seen in pernicious anaemia. The blood count was: red cells, 6,140,000 per c.mm.; haemoglobin, 50 per cent.; colour index, 0.41. A fractional test meal two days later showed complete achlorhydria with very low total acidity. I suggested that he should take half a pound of liver daily, but continue to serve as a blood donor if pressure symptoms returned.

On June 12th the blood count was: halometer reading, 4.8 degrees (= 7.2 μ); haemoglobin, 60 per cent.; red cells, 4,320,000 per c.mm.; colour index, 0.72; white cells, 15,000 per c.mm.—polymorphs 84 per cent., eosinophils 1, basophils 2, lymphocytes 13. No nucleated reds were seen. He still had a sensation of fullness and pressure in the head and limbs, despite the anaemia; and it occurred to me it was possible that the blood viscosity was still increased, and might be to some extent independent of the blood count. Estimations of the viscosity were, however, not made until a later date.

On July 6th, after two months' liver treatment, he again gave blood for a transfusion (the fortieth), and the Wassermann reaction was retested and found strongly positive.

On July 13th he developed an acute pain in the right side of the abdomen and vomited; he was admitted to the Infirmary under Mr. Mouat as an emergency. The pain rapidly subsided without treatment (other than rest). The Wassermann reaction was again found positive; he was sent to the venereal department for treatment under Dr. Hallam, and a course of intramuscular bismuth and intravenous arsenical preparations was commenced. He denied all possibility of his having acquired syphilis, either before or since the first Wassermann reaction was tested.

On July 23rd blood examination showed: halometer reading, 4.8 degrees (= 7.2 μ); red cells, 7,400,000 per c.mm.; haemoglobin, 95 per cent.; colour index, 0.65. Viscosimeter tube experiments were performed, using hirudin as an anti-coagulant, with the following results:

	Patient	Control 1	Control 2
Blood	7 min. 0 sec. 7 min. 15 sec.	6 min. 27 sec. 5 min. 50 sec.	5 min. 18 sec.
Serum	2 min. 5 sec.	1 min. 55 sec.	1 min. 50 sec.

Distilled water, 1 minute 3 seconds.

The viscosity, therefore, was not much in excess of normal, despite the fact that a definite polycythaemia was again present. (During the period May–August, 1931, the patient was regularly on liver diet, and all soreness of the tongue and anaemia disappeared.)

On November 11th he came up for a venesection, as the sensation of fullness in the head and limbs was returning; 500 c.cm. of blood was removed. He was now taking liver only occasionally, but no soreness of the tongue had returned. About this time he was suspended from work owing to bad trade.

On January 28th, 1932, the blood count was: halometer, 5.1 degrees (= 6.8 μ); red cells, 7,050,000 per c.mm.; haemoglobin, 82 per cent.; colour index, 0.58; white

cells, 13,000 per c.mm. He had slight congestive symptoms, and stated that the intervals between the development of these symptoms were longer than they used to be. On February 8th the Wassermann reaction was retested and found negative (he was still continuing anti-syphilitic treatment). On the 25th the congestive symptoms were again intense, and a venesection was performed, only 250 c.cm. of blood being removed owing to difficulties due to the high viscosity. The blood count was: red cells, 10,300,000 per c.mm.; haemoglobin, 120 per cent.; white cells, 21,600 per c.mm. The viscosity time for whole blood with the same tube was 23 minutes. The Wassermann reaction was again negative.

As the patient here described has been seen at one time or another by probably every physician in Sheffield, I regret if I have not asked the permission of all of them to publish the case. I am indebted to Dr. Margaret Platt for the viscosity tests.

REFERENCES

- ¹ Freund, H.: *Münch. med. Woch.*, 1919, lxvi, 1, 84.
² Minot, G. R., and Buckman, T. E.: *Amer. Journ. Med. Sci.*, 1923, clxvi, 469.

INTRANASAL TREATMENT BY IONIZATION IN HAY FEVER, VASOMOTOR RHINITIS, AND OZAENA

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In the eighteenth century, when the static machine was the only source of electrical supply, Privati and L'abbé Nollet discussed the possibility of introducing medicinal substances into the body by means of electricity. The discovery of the electric cell in the early part of the nineteenth century and the subsequent rapid advance in electrophysics made possible the application of the galvanic current to the human body. Throughout the nineteenth century many reports were written of the results obtained by the electrolytic introduction of substances into both human and animal tissues. In 1833 Fabre-Palaprat claimed remarkable success in the treatment of malaria by the electrolytic introduction of quinine through the healthy skin. A wider interest in the subject of ionization in electrotherapy was created by Leduc when he published the first of his series of papers in 1900, while his address before the Radiological Section of the British Medical Association in 1907 resulted in the more general adoption of the method in this country. Since then Stevenson, Cumberbatch, Friel, and others have, by their writings, assisted the growth of the seed planted by Leduc.

Experience has taught us that physiological and chemical changes are effected by the action of the galvanic current on the body tissues, and that hyper-irritable areas are rendered less sensitive. In 1924 I first began to note the effect of zinc chloride and zinc sulphate solutions on the sensitive areas of the nasal mucosa. These areas are particularly affected in hay fever and vasomotor rhinitis. They are situated mainly on the surface of the inferior turbinate bone, the lower border of the middle turbinate, and the adjacent surface of the nasal septum. They readily respond to the changing humidity and temperature of the inspired air. Their reactions are controlled by a delicate nerve mechanism involving, it is thought, a nerve centre in the medulla oblongata, which receives impulses through the fifth, tenth, and eleventh cranial nerves and the sympathetic system. The normally maintained physiological balance may be upset by a variety of factors—extrinsic, acting through the inspired air, intrinsic, acting through the blood stream, and reflex, from stimulation of distant parts of the vagus and

sympathetic system. The clinical expressions of the imbalance so produced are congestions of the nasal mucosa, sneezing, rhinorrhoea, and itching of the inner canthus, nasal vestibule, roof of mouth, neck, and, as is sometimes experienced in hay fever, of more distant skin surfaces. Drake (*British Journal of Dermatology*, 1928) associates an asthma-eczema-prurigo complex with these clinical manifestations, which he ascribes to a dysfunction or disharmony of the autonomic nervous system. It is outside the scope of this article to consider the debatable causes of this nasal imbalance, or its relation to the specific or allergic phenomena in general. Intranasal ionization is essentially a local treatment, and, at least in hay fever, the relief of symptoms seems to be independent of any exciting cause.

The treatment by zinc ionization of the hypersensitive areas in the nose has in my experience given relief in a higher percentage of cases than have other methods. The relief is obtained with relatively little discomfort and with few applications. The technique, simplified by use of the intranasal ionizer, was described in the *British Medical Journal* of June 27th, 1931 (p. 1115). Zinc chloride and zinc sulphate in 1 per cent. solution are equally effective, provided that a small amount of glycerin is added to the latter. Thin films of wool are soaked in the solution, wrung out flat, and applied to the sensitive areas of the nose. The exact application of the thin wool films to the middle turbinate, the adjacent septal surface, and the inferior turbinate is of the first importance, and should be carried out with the assistance of a proper illumination by direct or reflected light. The subsequent packing presses the films firmly in contact with the mucosa and fills the remaining space in the nose so that all the wool is in contact with the intranasal zinc rods. A range of current from 2 to 5 milliamperes is passed for fifteen to twenty minutes. Both sides of the nose may be treated simultaneously, unless the patient is particularly sensitive. A metallic taste is at once experienced, which serves as a useful indication that the current is properly applied. An interval of ten days should elapse between treatments. A careful inspection of the nose and sinuses should, if possible, be made in the quiescent period. Marked obstruction, or any factor liable to interfere with the efficiency of the nose, should be dealt with. Although an operation for obstruction or the removal of a pathological lesion may not directly affect the occurrence of hay fever, it does allow better access for treatment by ionization. Extreme cases of nasal obstruction cannot otherwise be adequately treated. The treatment may be given either before or during the hay fever season.

RESULTS OF TREATMENT

Hay Fever.—Of fourteen cases treated before the season, eleven had no attack during the following season. Three were not benefited. The average number of treatments was six, at fortnightly intervals. The return of any symptom, notably of itching of the eye or nose, is an indication for further treatment. In this quiescent period the ionization should produce a white film on the treated mucosa.

Seventy-seven cases were treated during attacks. Fifty-one were females and twenty-six males, the ages ranging from 10 to 62 years. Fifty-four had no further attacks, six were not benefited, and eleven failed to report. Most of the cases had two or three treatments. All were extreme cases, which had previously undergone various types of treatment without benefit. In some cases the symptoms were intensified for twenty-four to thirty hours, followed by relief; others were relieved with dramatic suddenness. The sneeze was the first symptom to disappear, and the itching, especially of the eye, the last. In many cases the eye continued to irritate although the sneeze and rhinorrhoea were relieved. The swollen, turgid tissues were contracted at the end of treatment, but the white film deposited on the mucosa of the quiescent cases was not seen. It is impossible for me to explain the action of ionization