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(For discussion, *vide* p. 717.)

*Chronic Sepsis and Mental Disorder.** By T. C. GRAVES, B.Sc., M.D., F.R.C.S., Chief Medical Officer, Birmingham Mental Hospitals Committee.

THIS subject should not be discussed, least of all in Scotland, without a tribute being paid to the work of Dr. Lewis Bruce, of Murthly, whose book, *Studies in Clinical Psychiatry*, published twenty-one years ago, is devoted to a consideration of the toxæmic causation of mental disorder.

At the present time what more fundamental conception can be advanced than is contained in the following paragraph from his book: “The bacterial toxæmias of insanity are chronic, and indicate that the real disease lies deeper than the mere toxæmia, the disease being rather a failure of the patient to form antibodies.”

The persistence of chronic infections in which there is an eventual failure of the local tissues to respond to the invasions of organisms and their toxic products, *i.e.*, in which the local tissues become poisoned, undoubtedly has a profound effect upon the mental processes of the individual.

The study of one case may be more valuable than striking an average over a large number of cases, since each is a problem by itself. I would therefore ask your consideration of the details of a case which illustrate a method of stimulating a favourable reaction to chronic toxæmia by non-specific protein therapy and surgical treatment of the septic foci.

Female, single, born December 5, 1906; fifth and youngest child, born when mother aged 44. Great grandmother suffered from “nerves.” Mother had

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"nervous breakdown," depression, insomnia and refusal of food—not certified—at ages of 26, 41 and 59, and is now a mental and physical invalid, with constant headache and irritability. She had some fits at the birth of the third child, and until a year ago suffered with gross oral sepsis. Two brothers have chronic nasal disease, and her sister—the brightest of the younger members of the family—probably does so too.

The patient, at the age of 3, had scarlet fever with left otitis media, since when the left ear continued to discharge until she reached eight years of age, when it apparently ceased, but recommenced again in her teens. At school she reached Standard VII at the age of 14. She was reserved, did not make friends readily, but had initiative and thought for others, quiet, liked reading, played the piano and passed some examinations in music. However, she always seemed somewhat "lost," was never on the alert, and replies to questions were generally given after a long latent period.

Menstruation irregular, once at each of the following ages: 16, 17, 18 and 18½, about the last age the ear discharge became more profuse and she had to leave work.

Six months later a mastoid operation on the left ear became necessary. Performed on December 20, 1925, following which menstruation became regular 4/28 days. She was to have returned to hospital for further treatment of the recognized nasal sinus disease, but did not do so, as she became depressed, developed persecutory ideas, showed lack of interest, and on one occasion put her head in a gas-oven.

During May, 1926, she improved, and early in June went back to work; her weight had increased, but she complained of an unpleasant taste in her mouth in the morning. Later in June she became exalted, showed loss of appetite and wandered away from home. Auditory hallucinations developed early in July, and after a week of more acute confusion and hallucinatory conduct she was certified and admitted to the mental hospital on July 13.

On admission she showed complete disorientation, was wandering in conversation, noisy, restless, faulty in habits, mischievous, erratic and, at times, violent. Vivid auditory hallucinations were shown to be present by her answers to the "voices," during which she turned her head to the left; she also imagined her doctor was under the bed. She exhibited catatonic manifestations and waxy flexibility.

She menstruated for five days following admission; the acute symptoms necessitating certification were therefore coincident with the pre-menstrual phase.

Temperature 98.2° F. Apex beat fifth space, 4½ in. from middle line; no heart murmurs; pulse-rate 80. Peripheral circulation poor, face pale; coarsely pored skin with scattered chronic papular staphylococcal eruption of the face. Lungs and other viscera appeared healthy; urine negative. Mastoid scar satisfactory; discharge from left ear. Tonsillar glands palpable on both sides; tonsils small and septic; pus in right nose. Left antrum darker than right.

Later there was found redness of the endocervix, with a muco-purulent discharge containing Gram-positive diplococci, short Gram-negative and positive bacilli. Wassermann reaction negative in the blood. Widal negative to typhoid, paratyphoid A, B, and C, Ærtrycke, Shiga and Flexner Y, but positive 31 Oxford units to Gaertner. A carious tooth was extracted.

The severity of the chronic septic toxæmia obviously precluded any physical improvement, and as her mental symptoms also showed no alleviation, it was decided to treat the condition by non-specific protein therapy. A course of eight (five-day interval) intravenous injections of T.A.B. vaccine (B. W. & Co.) was given during August. There was no immediate mental improvement, but she ceased to lose weight.

The serological agglutination tests now showed a rise of titre to maxima of typhoid 6, paratyphoid A 100, Gaertner 625, Ærtrycke 20 Oxford units; paratyphoid B remained negative. Ærtrycke rose early to its maximum; paratyphoid A and Gaertner maxima were synchronous, but later, whilst the very low figure of 6 for typhoid was late in appearing at the time when the values for the other organisms were falling. Much later Flexner Y became positive, giving a maximum of 14 units and then falling. Towards the end of this treatment a test of the permeability of the brain membranes to bromide was carried out, the value obtained being 3.64—a

distinct decrease of normal permeability. In September her weight slowly rose, she became more composed and better behaved, although depressed—a reversion to an earlier mental phase. Menstruation occurred for four days during August and again in September, but was absent in October. This may be considered as the clinical positive stage following the protein therapy.

On October 27 a general sinus examination and irrigation (Watson Williams' technique) was carried out under local anæsthesia. The left sphenoid sinus and the left antrum contained pus; some muco-pus was also present in the right antrum. Following this sinus wash-out an acute exacerbation of the facial eruption occurred and a similar eruption over the whole trunk and limbs appeared. The papules became pustular, hæmorrhagic, and so irritating as to cause the patient to pick them—the “picking sores.” A similar process affected the soft tissues adjacent to the nails, causing an acute onychia of the left thumb (the nail of which was shed) and the left ring finger.

The gynæcological state was treated.

On November 14 the tonsils were removed by dissection and both antra were again washed out. Following this the skin eruption improved considerably, and at the end of December it had practically disappeared from the face; the onychia also cleared up, the nails showing no deformity. Scars on the limbs and trunk, due to the deeper injury inflicted by picking, remained for some time, as shown by the photograph dated February 16, 1927. At this period she had gained a stone on her admission weight, and although some mental depression was still manifest, she began to show interest, especially in music. At this time the bromide permeability test gave a normal figure—3.02. Catamenia had not returned, although aloes and iron had been given. A second course of non-specific protein therapy was given and ultra-violet light was commenced in January.

The agglutinin reaction to this second course was similar to the first. No abnormal organisms were found in the fæces. Catamenia returned in February and continued regularly afterwards. The nose, however, continued to show some sepsis, and intra-nasal drainage of both antra was performed; following this the ear discharge diminished.

A much more definite physical and mental improvement now followed and she recovered to the extent that she was sent out on trial on May 12. Later her doctor's, visitor's and relative's reports were satisfactory, and she was discharged recovered. Her sister reported that she had never known her so well and so alert.

Discussion of Case.

(1) In this case definite heredity can be traced. The patient developed mental disorder, and became certifiable at an age earlier than that at which it was exhibited in the parent, thus fulfilling the “Law of Anticipation.”

These facts, together with the progressive nature of the symptoms culminating in a catatonic, confused state, suggest a bad prognosis. Nevertheless substantial recovery—“she was never so well before”—occurred after treatment of septic foci. Are we not, therefore, justified in considering psychotic heredity as being in part, if not wholly, made up of other components? In this case chronic sepsis was present in the mother and in the younger members of the family, as well as the patient. I suggest the term “septic heredity,” which connotes the effect of the maternal toxæmia upon the child *in utero*, and possibly offers a more hopeful prospect. Another component which must not be disregarded is “transmissible familial infection.”

(2) The progressive nature of the long-standing septic process results in a progressive deterioration of mental capacity. Starting from scarlet fever and otitis media, the septic process later involved nearly all the nasal sinuses. On the mental side the aprosexia of Guye was manifested, to be later followed by melancholia, exaltation, confusion and catatonia. The hallucinations were referred to the more diseased side of the head.

(3) The effect of the toxæmia on the reproductive mechanism: It is well known that menstruation has an effect on nasal disorders and conversely. This case illustrates the serious effect of sinus disease on the reproductive function. In ordinary cases of sinus disease there may be a marked deterioration, in the severe cases it may be totally abolished.

(4) The exacerbation of the skin infection following sinus wash-out and its improvement after removal of the diseased tonsils and further wash-out indicates that there was, and had been, a general dissemination of infection from the portals of entry—the mucosa of the head—to the portals of exit—the skin and mucosa of the cervix—producing there low grade chronic inflammatory states.

It is interesting to compare this skin reaction with that recently described by McCrea in "Retinal Petechiasis."

(5) The poor typhoid-agglutination response as compared with the high titre given to the food-poisoning group indicates the probability that at some period she had had a ptomaine infection, with its neurotoxic possibilities. What relation the septic infection bears to the food-poisoning infection is a matter which we are studying.

(6) The improvement in the brain membrane permeability values associated with an improving mental state following surgical treatment of the septic foci is interesting.

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