result. The attacks themselves have been reduced from twice or three times a week to once a month, with a great diminution in severity.

It should be emphasized that the relief of nasal symptoms occurred before the patient could possibly have known how beneficial the treatment was going to prove in the relief of her menorrhagia. While under treatment with progesterone it was noted that the two attacks of rhinorrhoea coinciding with menstruation developed thirty-six and forty-eight hours respectively after the last injection. The remaining attacks, not coinciding with menstruation, were separated by an interval of not less than seven days after the last injection. Throughout treatment there has been no alteration in her environment, daily life, in the nature of her work, or in the length of her working hours. She is at present continuing in the same post that she has held for the last four years.

Discussion

That some relationship may exist between the nasal mucosa and sexual activity has been observed for centuries. In recent times Mackenzie (1884) noted that some women, with otherwise healthy noses, suffered from nasal congestion at the time of menstruation, and also that this congestion was sometimes present in members of both sexes as a result of sexual activity; more recently still, work has been done on monkeys and on the human subject which appears to prove beyond reasonable doubt that oestrin, whether applied locally or given by injection, can cause nasal turgescence (Mortimer *et al.*, 1936a, 1936b), and that this effect can also be produced by the male sex hormone (Hamilton, 1937-8). Hoseason (1938) describes cases of vasomotor rhinorrhoea and nasogenic asthma associated with the menses, and recommends treatment by intranasal zinc ionization. The effect of progesterone, however, does not appear to have received attention, and we feel that its success in controlling severe rhinorrhoea in our one case merits further investigation. A promising line for clinical research is indicated, which can be simply carried out. The effect of progesterone can be observed in a series of cases of spasmodic rhinorrhoea, and we hope to observe its effect on hay-fever during the coming summer.

Spasmodic rhinorrhoea is, of course, often due to allergic sensitivity, but, as Oriel (1936) points out, there is an important group of cases in which the patients are not specifically sensitive, as judged by skin tests, and which cannot be attributed to occupational or environmental factors. These cases may, like that under review, be suffering from a change in the secretion of the sex hormones, and may respond to suitable therapy. We think it possible that in our case, for instance, the patient was producing excessive amounts of oestrin, which caused her apparently unrelated symptoms. The physical factor—changes in temperature—may be taken as the exciting cause of her rhinorrhoea—"the last straw."

On the evidence available we are unable at present to say whether progesterone acts in direct antagonism to oestrin, whether it is inhibitory to the production of oestrin by the ovary, whether it has a specific action on the nasal mucosa, or whether some other factor may be responsible.

Summary

A case of spasmodic rhinorrhoea associated with menorrhagia has been treated with progesterone, and the results have been discussed.

We make no pretence of drawing conclusions from one isolated case such as this.

We wish to emphasize that the sole purpose of this paper is to draw attention to a possible line of research

which, if carried out on a sufficient number of suitable cases, we believe might yield valuable results.

We wish to express our thanks to Mr. R. Thomas, surgeon in charge of the ear, nose, and throat department, the York County Hospital, for his advice and help, and to Messrs. Paines and Byrne, Ltd., manufacturers of gestone, for the information they have very kindly supplied.

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PSYCHIATRIC SYNDROMES IN MYASTHENIA GRAVIS

BY

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Recently two patients with different psychiatric syndromes were admitted to the Royal Edinburgh Mental Hospital, and in both the symptoms of myasthenia gravis were prominent. One of these patients was referred with the diagnosis of a severe psychoneurosis, and the other was admitted because he had become very disturbed in a general hospital ward. The case record of the former patient will be presented briefly to emphasize the necessity for differentiating between a psychogenic disorder and a myasthenia gravis, and also to convey a warning of the possibility that a frank organic process may develop insidiously in a patient with a psychiatric syndrome. The case record of the second patient will be presented briefly to illustrate a complicating factor of myasthenia gravis which proved to be difficult to handle therapeutically and which contributed to the fatal outcome.

Case I

A single woman aged 40 was admitted to the Jordanburn Nerve Hospital with the following complaints: sadness and crying spells, difficulty in swallowing and chewing, double vision, and weakness of the neck. Her past history was essentially negative. Inquiry into the family history showed that her father, who died from cerebral haemorrhage at 60, was a very domineering person, and was feared by his children. Her mother, at the age of 75, suffers from trigeminal neuralgia, and has been very domineering since her husband died, being feared by the children. The patient has three younger brothers—all well, and with a cheery open disposition. There is no neuropathic or psychopathic trend in the rest of the family.

PRESENT ILLNESS

The patient stated that as long as she could remember she has had various pains, aches, sensations of fatigue, anxiety, headaches, spells of sadness and blueness, and, in fact, cannot recall a day when she was well. She was reared in an atmosphere of extreme discipline, which engendered fear, anxiety, and trembling, and much personal suffering. In 1918 she experienced her first severe depression, at the age of 20. The occasion was a disappointed love affair, the mother refusing to consent to the patient marrying at this age. The

depression lasted for two months and then cleared. She then tended her father for five years after he was rendered a helpless invalid by a cerebral haemorrhage. This placed an extra strain upon her until her father's death, when she developed her second episode of depression. This lasted for six months, and was attended by much retardation.

The third episode of depression occurred in 1928 following the birth of an illegitimate child, the product of another disappointing love affair. This episode lasted for four months, and was similar to the previous ones. The fourth term of depression began when her favourite brother died from meningitis. This lasted for six months, and then cleared completely. In the intervals she felt rather happy, but was tortured by pains, aches, etc. In May, 1937, blurring of the vision for distant objects developed. Lenses were prescribed and vision was improved. In April, 1938, blurring of the vision returned, and horizontal diplopia developed for the first time. The latter symptom created an increase in her emotional instability, and was one more cause for the patient's mother to "nag me further." The patient's home life became unbearable. She became depressed mildly, secretive, and seclusive. During the next month nasal speech developed, with fatiguing of the voice on use. These symptoms have slowly become worse since their inception. In July swallowing difficulties began, with regurgitation of fluids through the nose. Tiring of the jaws in mastication occurred often. In August weakness of the neck muscles developed, and difficulty in raising the head from the bed started at this time.

In September the patient experienced difficulty in turning over in bed. At this time generalized weakness developed, and she began to lose weight because she could not eat enough food owing to trouble in masticating and swallowing. Anorexia developed, and she had a fear of eating because of the choking spells incited by attempts to swallow. These symptoms were looked upon as psychoneurotic. The patient struggled on for four months, and became very depressed, tearful, and rather emaciated. She had been known to be a psychoneurotic with recurrent depressions, and she continued to be labelled as such by those who saw her. Housework became difficult to carry out in her weakened physical state, and the mother became more irritating to the patient. The patient visited a hospital clinic, and was referred to Jordanburn as a case of psychoneurosis with depression.

PHYSICAL EXAMINATION AND TREATMENT

A general physical examination showed a moderate degree of emaciation and a marked vasomotor instability in a tall thin woman. Neurological examination revealed the typical myasthenic syndrome: varying ocular palsies; myasthenic facies with the bilateral weakness of the facial muscles; marked paresis of the palatal and pharyngeal muscles; weakness of the neck muscles, sternocleidomastoideus, and trapezius; bilateral ptosis, left more than right; great weakness of the trunk muscles, in that she would have to roll over on her side and use her arms to push herself up to the sitting position. The voice became inaudible and the speech non-understandable after a few minutes of speaking. Sensation was normal, and the deep reflexes were very hyperactive. The patient sobbed many times during the examination, and appeared most depressed. She did not seem greatly retarded in behaviour or speech. The remainder of the mental examination appeared to be normal, though it was difficult to gain contact with the patient owing to her inability to talk and because of her emotional incontinence.

The patient has responded very well to prostigmin therapy. As a result her mood has changed and she is regaining hope and losing fear.

This case record illustrates the extreme importance of approaching these patients from a psycho-biological viewpoint—that is, the patient should be considered as a whole, as a completely integrated personality in which the mind and its problems are closely intertwined with the body and its problems. We must never forget that in patients with predominantly mental symptoms these are

occurring in a physical structure that may become influenced by the mental symptoms or may develop an entirely independent train of physical symptoms, as was shown in the above case. Frequent examinations of patients with psychiatric syndromes, from the physical standpoint, should be made in order to assure oneself that an organic process is not insidiously developing.

Case II

A single man aged 24 was admitted to West House on transfer from the Royal Edinburgh Infirmary because he had become unmanageable in the open ward. His case had been considered one of myasthenia gravis, and he had been receiving treatment for some weeks with a fair degree of response. Suddenly his mental state underwent a complete change. He became overactive, behaved queerly in the ward, disturbed the other patients, was exhibitionistic, talked constantly day and night, was very aggressive, abusive, irritable, and tempestuous, while at other times he was merely elated and happy, and obeyed quite well.

The physical and neurological examinations manifested the typical signs of myasthenia gravis—that is, bilateral ptosis; weakness of the facial muscles, muscles of mastication, deglutition, phonation, articulation; weakness of arms and legs after use; tiring of all of the above muscles after use; weakness of the neck muscles; and poor excursions of the chest.

MENTAL EXAMINATION

The following were the salient points obtained from this examination: The patient was restless, mischievous, overactive, refused to stay in bed, and insisted on wandering around the ward and annoying the other patients; he assaulted the attendants, threw articles about the ward, appropriated other patients' possessions, and wrote on the walls, tables, etc. There were no stereotyped actions or katatonic symptoms. He thought that the food was poisoned, and that people were watching him; he expressed much fear of everything. He thought that there was a fire under his bed, and that he was being gassed, and he wrote many incoherent letters. His mood was mostly one of anger, irritability, and anxiety; at times he was elated, but this mood swing was always transitory. Depression was rare. He was disoriented as to time, person, and place during his entire hospitalization. Recent memory was impaired, but remote memory was good at times; attention and apperception were also good at times. His general intelligence was fair when his attention could be gained, and his insight was good with regard to his physical illness but not to his mental state.

TREATMENT

The patient continued to have the same treatment as before admission to West House—that is, prostigmin, atropine, and ephedrine. For the first two days the extreme restlessness was abated somewhat by sedation, as hyperactivity in myasthenia gravis is not desired. However, from the fourth to the sixth day he suffered several respiratory crises, and finally succumbed in one crisis despite increased and frequent injections of prostigmin and other medications. Post-mortem examination was negative save for a slightly enlarged thymus gland.

It was unfortunate that this patient developed a type of psychosis marked by such extreme psychomotor activity, which was undoubtedly contributory to his death. Any activity is undesirable in a case of myasthenia gravis if the patient is not responding well to treatment.

Summary

Two cases of myasthenia gravis are reported, in both of which a psychiatric syndrome was predominant. Case I had been considered one of severe psychoneurosis with recurrent depression before admission, and the necessity for approaching any patient, and particularly a mental patient, from a psycho-biological viewpoint is emphasized.

An organic process can develop in a patient with a psychogenic process, and this case record is a testament to that dictum.

The record of Case II illustrates a very unfortunate complicating factor in myasthenia gravis—that is, the development of a psychosis with an extreme degree of psychomotor activity. The latter without a doubt contributed in no small measure to the fatal outcome.

I am greatly indebted to Professor D. K. Henderson for his permission to publish these cases from his services at Jordanburn Nerve Hospital and West House, of the Royal Edinburgh Hospital for Mental Diseases.

RECENT WORK ON THE QUALITY OF HEAT RAYS

BY

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Effects depending on the quality of heat rays when these affect the skin are of considerable interest. It is known that warming an area of skin reflexly produces vasodilatation in the mucous membrane and consequent narrowing of the nasal airway. Cooling the skin has the reverse effect (L. Hill, 1919; Grant, Mudd, and Goldman, 1920). In a series of publications since 1932 (Hill, 1932, 1933a, 1933b, 1934, 1935a, 1936a, 1936b) I have described also the reverse reflex effect—namely, vasoconstriction, and widening of the airways, both nasal and pulmonary—(Hill, 1936c) produced by short infra-red rays. While Dufton and Bedford (1933) and Winslow, Greenburg, and Herrington (1934) failed to obtain this effect, Thomson (1934) and van Dishoeck (1935) confirmed it.

The Nose-widening Effect of Short Infra-red Rays

The failure of critics to obtain the short infra-red ray effect was due to their employment of a method that was not sufficiently sensitive. They did not realize that the normal airway of the resting subject is very much larger than that required for quiet breathing (Hill, 1935b). I invented a simple apparatus for measuring the airway of either side of the nose (Hill, 1936d), and found that while normally the narrowest part is about 30 sq. mm. in area, 14 sq. mm. and even less sufficed for normal quiet breathing. Van Dishoeck and I also pointed out that while the narrowing effect of dark heat on the nasal airway, and widening effect of cold, are found in almost all subjects, the nose-widening effect of short infra-red rays can be shown in many, but not in all, subjects. Dishoeck chose his subjects from those readily sensitive to the action of adrenaline and histamine. I pointed out that antagonistic effects of cooling influences, such as cold feet or a draught, must be kept in mind. The reflex effects vary in different individuals and for the same individual from day to day, for the infra-red rays exert a nose-widening effect only so long as the surface of the skin is cool, not when heated by strong irradiation and high external temperature or by muscular exercise.

G. Lehmann (1939) has recently confirmed the "L. Hill nose reflex," and carried on this discovery by showing that the reflex applies not only to the airways but to parts of the skin other than that irradiated. As sources of infra-red rays he used (1) an iron plate electrically heated to about 300° C. (dark heat), and maintained at that temperature by a thermostat; (2) a small naked arc lamp. For observing the reflex effects on the skin he used a

plethysmograph fitted to a finger, with an outer case which was kept at a constant temperature of 25° C. He also used the external auditory canal as a plethysmograph. The size of the nasal airway he recorded by an accurate method, and one which had the least disturbing effect on the normal conditions. The subjects were kept at rest in a cool room, and the effect of cold feet and draught avoided. To eliminate any psychological effect experiments were carried out, as I had done, on subjects who did not know what reaction was expected, and the dosage of heat from the iron plate and from the arc was so adjusted that the subject did not know, when blindfold, which source was being used.

Effect of Infra-red Rays on the Skin

Lehmann not only confirmed the nose-widening effect of the short infra-red rays, but showed that the vasoconstrictor effect applied also to the skin, and that high-frequency waves (6 metres "ultra-short" diathermy) gave a like result. These waves, and short infra-red rays, penetrate and warm the deeper skin, while long infra-red rays and long diathermy waves do not penetrate, and warm the surface, whence heat is conducted in (Sonne, 1921). The natural condition of the skin is a fall of temperature from within, where the warm blood flows, to the cool surface, and this temperature fall, acting on nerve endings in the Malpighian layer of the epidermis, reflexly causes vasoconstriction of the skin and of the membrane of the airways, with consequent widening of the latter. When this fall is reversed by warming the surface the opposite results—vasodilatation, with consequent compensating body-cooling effect, and narrowing of the airways. I pointed out that the reflex was of nervous, not humoral, transmission, because it occurred in three to five seconds. Lehmann confirmed this conclusion. On stopping the circulation in a hand which was irradiated with long infra-red rays (this was effected by means of a sphygmomanometer cuff) he found the vasodilatation and nose-narrowing effects were prevented, to return on renewal of the circulation. This was because after stoppage of the circulation the deeper skin, no longer being cooled by the blood, became as warm as the irradiated surface. Short infra-red rays, when the circulation was stopped, on the other hand, made the deep skin warmer than the surface, and produced their usual reflex effects. If, while the hand was irradiated with long infra-red rays and the circulation through it stopped, the blood in the axilla was cooled by an ice pack, then on letting in this cold blood reflex vasodilatation and nose-narrowing resulted, to cease when the circulation was again stopped. This was so because the cooled blood, on reaching the skin of the hand, intensified the reversal of the natural fall of skin temperature from within out.

Sunlight is rich in short infra-red rays, long infra-red rays being filtered off by the atmosphere, and so long as the surface of the skin is cool these produce vasoconstriction and nose-widening effects. With high outside temperature, little air movement, and strong irradiation the surface of the skin becomes warmer than the blood, and the reflex effect is then reversed. The purpose of the reflex, which is subconscious, is to compensate for local warming of the skin by vasodilatation of other parts of the skin and the airways, and for local cooling by the opposite effects. With fresh ventilation and cool sunlit outdoor conditions the natural fall of temperature in the skin from within out is maintained, with constricted capillaries and wide-open airways. In stuffy conditions which heat the surface, such as are produced by dark heat and ill ventilation indoors, these conditions are reversed.