

returning and then again descending—the phantoms from the lacrymal fluids move either laterally or longitudinally; at such times, the anæmic portions of the retina remain firmly fixed. And I fancy that I can now detect them by a peculiar colour, or rather shade, by which they are distinguishable from all other entoptical images; namely, a pearly brightness, difficult to depict without the aid of a skilful pencil; but when once seen, not to be forgotten. I need scarcely add that, as they are the most alarming, so they are also the most obtrusive of entoptical objects, being visible with as well as without pencils, and visible alike in daylight and by artificial light. They are more affected than any other spectres by overwork of the eyes; and I have invariably found them disappear after a sufficient period of rest, and return when the eyes were fatigued by much work; and, like all the other appearances I have mentioned, to be by far less annoying in the clear and brilliant sunshine of the South, than in the twilight of an English winter's day.

“It has been quite a source of employment for spare moments, to note the effects of external circumstances upon my *muscæ volitantes*. In the first place, reading or writing always causes with me some muscular contraction (a spasm of the voluntary muscles of the eye). This renders all apparitions very much more conspicuously visible. I have noticed that painting does not produce the same unpleasant effects, although pencil- or chalk-drawing does, but still in a far less degree than reading or writing. In fact, I have found it to be an invariable rule, one which may prove of use to others similarly affected, or suffering from weak sight (either associated with anæmia or hyperæmia of the retina), that any kind of employment which involves the looking at coloured objects, or the varied landscape, is not only far less trying than when the sight is exercised on black or white objects; but after the fatigue of reading, if I turn to my painting, or walk out for a while, the retina very quickly recovers itself. I may mention, however, that my retina appears to be at all times morbidly sensitive to light; and that any unusual printed characters, such as Hebrew, Greek, or German, are very trying to my sight. Entoptical objects also become most numerous after reading Hebrew. I append a portion of my field of vision, seen by the aid of a divergent pencil of light, after

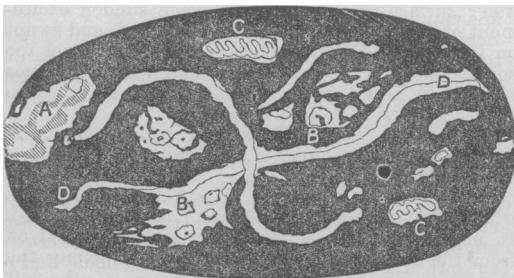


Fig. 9.

an hour's reading. A A, portions of fibre; B B, clusters of spectra, probably beads, in the vitreous humour, forming parts of larger fibres; C C, anæmic portions of the retina; D D, deeper fibres in the vitreous body. The background is shaded merely to give prominence to the spectra; and the oval indicates that the central part of the field is more thickly covered. All the images sink gently downwards when the eye returns to rest.”

[To be continued.]

ON IMPAIRED NERVOUS POWER, FROM ALTERATIONS IN THE QUANTITY OF THE BLOOD CIRCULATING IN THE BRAIN.

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THE morbid processes which influence the functions of the brain are various and widely different. Whatever the alteration, the effect is manifested by some loss of power or force, the extent varying, according as the mischief is simple or severe, implicating a portion of the nervous tissue of small consequence or absolutely needful for the continuance of life.

The mental power alone may be diminished. To this there may be superadded a suspension of ideas; the individual halting in a conversation, in the middle of a sentence, or of a word, not from a difficulty in articulation, but from losing the string of ideas owned at the time by his mind. The discoverable effect may be thus constituted; or, in addition, there may be a loss of one or more of the special senses, ordinary sensation or motion, with or without muscular contractions, diminished nutrition, reflex actions, and perverted sensations. Even life itself may be suddenly or more gradually terminated, external impressions previously producing no effect, the semblance being that of death, but with the continuance of the circulation and respiration. How gradual and regular is this progress. The signs are very distinct. Their coexistence is agreeable to order, and guides us to the portion of the nervous centre implicated, and to the nature of the lesion, whether it be due simply to functional disturbance, to alterations in the quantity or quality of the blood circulating, to effusion of this fluid into the substance or cavities of the encephalon, to softening, slowly generated, or to inflammatory or some other condition.

These states are each suggestive, and deserving of distinct notice. Nevertheless, the present inquiry will be limited to the consideration of the various conditions productive of alterations in the quantity of the blood circulating in the brain, the effects arising therefrom being specially referred to.

The quantity of blood may be augmented or diminished.

1. The increase may arise from general or partial hyperæmia. In general hyperæmia or plethora—that bodily condition in which the blood is either in excessive quantity, or not increased, but more rich in fibrine and red corpuscles—the circulation is easily quickened by any sudden excitement. The blood-vessels in every part of the body are over-distended; they contain an excess of blood. Those in the brain are very liable to suffer, and frequently rupture, solely from this cause. In a measure, they are ready prepared for this, from the delicate nature of their structure, and their nearness to the heart. This state may be the forerunner of congestion, or of that variety of partial hyperæmia characterised by sluggishness of the flow, and an increase in the actual amount of blood in the vessels. The veins are principally affected; before long they are over-distended, and finally loaded. Thus the blood accumulates, and by degrees the capillaries dilate, and, by reason of their thin coat, readily yield to the pressure, if the onward current be not re-established.

Any obstacle preventing the return of blood from the brain is the most frequent cause of congestion.

The impediment may be in the heart itself, at the right auriculo-ventricular aperture—more often from regurgitation than from constriction. The internal jugular vein may be compressed by an aneurismal or other tumour. The convulsions in severe cases of pertussis are due to congestion; and in this way, the capacity of the chest is diminished by oft repeated respirations, the lungs in proportion being compressed; the amount of blood transmitted through them is thereby lessened, and its return from the head impeded, where it collects. In congestion, it is not often that consciousness is entirely lost; convulsions and a temporary paralysis may occur; usually all the symptoms pass away before the third day.

The quantity of blood in the brain may be increased, the flow also being quickened. In this example of partial hyperæmia, if the increase be small, the functions of the brain are performed with increased activity. If it be greater, there are restlessness, apprehension of impending danger, inability to fix the attention, feeling of fullness within the head, at times slight stupor and delirium, readily increased by stooping. Most often the circulation after a little time becomes again tranquil, and all the uneasy feelings vanish. More rarely inflammation of the substance of the brain supervenes. At some part the blood stagnates, not from any hindrance to the flow, but from the blood-discs adhering together and to the walls of the capillaries. This is soon followed by an exudation from the vessels, either composed entirely of the liquid portion of the blood, or a blastematous lymph, which coagulates between the nerve-fibres and cells. The symptoms are severe. The carotid arteries pulsate with great force and increased frequency. The whole circulation is excited. The pupils, at first contracted, afterwards dilate, often unequally, any sudden light producing little effect. Vision is impaired. Certain muscles or groups of muscles become rigid. Motion and sensation are lost. Stupor and delirium, intense coma, or sudden collapse, shortly precede death.

2. A decrease in the quantity of blood circulating in the brain may arise from a sudden and large loss of blood, or from an interruption to the current in the arteries that supply or are distributed to the brain.

In acute anæmia, from any sudden and large hæmorrhage, the amount of blood passing through the brain necessarily must suffer diminution, the proportion of the composite elements being in no way changed. The giddiness, loss of consciousness, perhaps dreadfully prolonged, the momentary suspension of respiration, resumed with deep sighing, sufficiently mark the action upon the nervous system.

The blood may coagulate within a healthy or a diseased vessel. When within a healthy vessel, it does so spontaneously and during life. Rheumatism, syphilis, the puerperal state, and debility in any way produced, appear to render the fibrine more liable to separate and form a clot. Such cases are uncommon. The following one is a remarkable example.

T. B., a joiner, aged 43, on the morning of March 2nd, 1861, while at work fell to the ground; when lifted by his fellow-workmen, he was unconscious; two hours afterwards was profoundly insensible. The mouth was drawn to the right; sensation and motion were abolished in the left arm and leg; when raised they fell as dead weights; reflex action could not be excited; the intestinal contents were passed involuntarily. He never regained consciousness, and died twenty-two hours after the seizure.

At the autopsy, the right internal carotid artery within the cranium, together with its branches, were

distended with a coagulum, which even extended into the branches of the ophthalmic. The vessels were completely filled. When cut across, the circumference of the clot was firm, the centre soft, most like ordinary clotted blood. It was divided at several parts with the same result. The lining of the vessels was of a natural colour, and quite smooth. The brain was throughout of ordinary consistence. The ventricles contained the usual quantity of serosity. The valves of the heart were healthy.

It was conjectured during life that blood had suddenly become effused into the right hemisphere of the brain. At the examination a different condition was revealed—an explanation of the symptoms. The character of the clot was peculiar, and clearly pointed to its formation some time before death. In all probability the interior of the vessels was first covered with a layer of fibrine, and upon this, according to the rapidity with which the blood-discs became entangled, a coagulum was formed, enlarging until the vessels were ultimately blocked up.

In arteries inflamed, the blood coagulates. The clot is often firmly adherent, and of a uniform colour. The heart is moderately distended; the calibre slightly diminished. The external coat is thickened from exudation into its interstices; the internal softened, and devoid of its natural polish. In some bodily conditions, a lowness of activity naturally exists, joined with general impairment of the nutritive power. In various organs and tissues the proper structure is replaced by oily particles—plates of cholesterine and calcareous particles. In the arteries, this change is not uncommon in the contractile tissue of the middle coat. The vessels then lose their power of contractility, are dilated rather than contracted. The calcareous particles not unfrequently project into the current, sometimes becoming free, from removal of the epithelial layer by absorption, and thus inviting foundations are formed for the raising of a coagulum.

The blood may coagulate upon some substance derived from a distance, composed either of the constituents of the blood, or the products of some morbid process. This condition, with the appellation of "embolon", was described some few years ago near the same time, by Virchow, in Germany, and the much lamented Kirkes, in this country. They stated that fibrinous fragments or vegetations adherent to the interior of the great vessels, the valves or inner surface of the heart, by some sudden excitement of the circulation, become detached, and swept on in the circulation until arrested by a vessel too small for them to move in. The vessel becomes blocked by a clot to the angle of branching, where the circulation is still going on.

The embolus may be formed in various ways. It may be composed simply of a coagulum, formed upon calcareous spiculæ, projecting into the interior of one of the great vessels, or an atheromatous patch, where the epithelial membrane has been removed. It may be formed of fibrinous patches washed off from the masses attached or interwoven among the chordæ tendinæ and columnæ carnæ of the left ventricle of the heart. It may be constituted by a vegetation, detached from one of the valves of the heart, the result of previous endocarditis. The vegetations are usually attached to the free border of the valves, and to those of the left side in preference to the right. They are generally small in size, and pass into the cerebral arteries and their branches; the middle cerebral more often than the anterior or posterior. The fibrinous particles are of good size, and frequently lodge in the internal carotid artery.

The resting place of the embolus is principally determined by its size, the position of the body at the

time the separation has occurred, the velocity of the circulation, and the angles formed by divergent branches. When an artery so obstructed is examined, it will appear as if distended with artificial injection, the coats being quite healthy. The plug is firm, distinctly laminated, like the contents of an aneurism; in shape mostly conical, the base directed to the stream; smooth; like an ordinary clot in colour; the apex often irregular, lighter in colour, and possibly identical in structure with fibrinous masses or vegetations, yet undetached.

The changes that ultimately occur are chiefly influenced by the size and position of the artery obstructed. If it be the internal carotid artery, by reason of its numerous inoculations with the branches of its fellow, and of the external carotid and the subclavian, the circulation is soon restored. If the embolus and the vessel be not adherent, the force of the circulation may produce dilatation of the vessel behind the obstruction, and the blood may gradually find its way between the plug and the vessel. In this way, the circulation may be in part restored. If the clot be firmly fixed, the dilatation may increase until the vessel ruptures. This is a rare cause of hæmorrhage into the substance of the brain. The embolus may be arrested at the angle of two divergent branches, loosely waving in one, and obstructing the other. This position may be easily altered, and the obstacle may again pass into the circulation, migrate, and obstruct some other vessel. The embolus may continue fixed in position, and gradually become less by a process of disintegration and absorption, the vessel once again becoming patent. When the obstruction continues some time, the nutrition of the brain suffers. Its consistence changes; it becomes soft, pulpy, almost diffuent at places, like cream in density and appearance; the extent of the alteration corresponding closely to the space within which the branches of the obstructed artery are distributed. In fatal cases, this is the most general *post mortem* appearance, death rarely following the immediate attack.

The symptoms are distinctive. The attack is most sudden, without premonitory warning. Consciousness is lost, after a few hours regained, disclosing partial or complete paralysis of one side. The face may be distorted, the tongue protruded to one side, the grasp diminished, and the foot trailed. Sensation is abolished, lessened, or perverted. Speech is defective, in the utterance of words, and even in the expression of ideas by signs. The paralysis is on the side of the body opposite to that in which the obstruction has occurred, thus agreeing with the distinctive character of cerebral paralysis from other causes. One side of the body may be completely paralysed, and the arterial pulsations in a part of the other be unable to be felt. Here embolism of the artery going to the part, is associated with a similar condition of an artery supplying the brain. Other internal organs in conjunction with the brain may be similarly affected; the spleen and kidneys more often than the liver. The first attack is often of short duration, succeeded by a second more lasting, it may be, of the opposite side of the body. In such the obstruction has become displaced, altered in position, and finally firmly wedged.

This condition may occur at any age. Of seven cases, three were under thirty years of age, while one was sixty-five. Four were males and three females. In every case a history of previous rheumatism was obtained, and the auscultatory evidence was clear of coexistent disease of the valves of the left side of the heart.

The treatment, immediate upon the seizure, must be directed to equalise and restore the circulation.

The recumbent posture must be strictly enjoined, and all constricting articles of dress set free. Some diffusible stimulant, as brandy or ammonia, may be administered. Some caution, however, is necessary, lest the circulation be excited in too great degree, and fresh particles of the obstructing matter become washed into the current. After consciousness has been regained, if the paralysis continue, the endeavour should be to hasten the absorption of the obstruction. Upon the supposition that ammonia possesses the property of liquefying the clot of coagulated blood, this alkali may be given. Even out of the body, upon the authority of Dr. B. W. Richardson, blood serum alkalified with ammonia possesses this property. Dr. Fletcher of Manchester (BRITISH MEDICAL JOURNAL, April 30th, 1864) has recorded a case of embolism which recovered, ammonia having been given in frequent and large doses. The symptoms were clear and well marked. The healthy nutrition of the body must be carefully maintained, so that, however small the quantity of blood is that the brain receives, it may be as nutrient as possible. With this view, a generous diet, wine and tonic remedies are indicated. Iron, quinine, alone or in combination with ammonia, or other approved absorbent, as the iodide or bromide of potassium, prove the most beneficial. Laxatives from time to time are necessary, and highly useful. Counterirritation behind the ear, or upon the crown of the head, by means of cantharidine blisters or the ointment of tartarated antimony, should not be omitted.

The foregoing considerations may be embodied in the following propositions.

An increase in the quantity of blood circulating in the brain, is alone adequate to produce impairment of its various functions.

The ulterior effects of the increase are much more serious than those of the increase itself.

A sudden diminution in the amount of blood distributed to the brain, is followed by complete paralysis.

Hemiplegia so produced, closely resembles hæmorrhage into or acute softening of the brain-tissue, not only in symptoms, but in power to destroy life.

CASE OF POISONING BY STRYCHNINE.

By R. J. ROGERS, M.R.C.S., late House-Surgeon to the Sussex County Hospital.

A FEMALE, aged 25, was admitted into the Sussex County Hospital, having, about an hour and a half previously, swallowed one of "Barber's Magic Vermin Killer" powders with suicidal intent.

When seen, she was stretched across a chair, with her legs rigid and extended, the trunk in a state of opisthotonos, and there were tetanic spasms of the muscles of the arms, neck, and face. With great difficulty, in consequence of the rigid state of the jaws, a tube was passed into the œsophagus; and, by the aid of the stomach-pump, a quantity of warm water was injected, which returned clear and of a pale green colour. She was then placed in bed. The thighs and legs were persistently rigid and widely separated; the muscles of the upper extremities, neck, and face, were in a state of violent spasmodic contraction. There were occasional short intervals of perfect quietude, during which she was quite coherent; and in one of these she stated the cause of her having taken the poison. Any sudden noise or movement caused an accession of the paroxysms. She was very thirsty, and constantly craving for