EMBOLISM OF THE RIGHT MIDDLE CEREBRAL ARTERY,

PRODUCING

LEFT HEMIPLEGIA AND HEMIANÆSTHESIA:

ABSORPTION OF A LARGE PORTION OF THE RIGHT
HEMISPHERE: DEATH SEVEN YEARS LATER.

BY

SEYMOUR J. SHARKEY, M.B.,
ASSISTANT PHYSICIAN TO ST. THOMAS'S HOSPITAL.

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E. J—, æt. 34, was admitted into Guy's Hospital on March 8th, 1876, under the care of Dr. Pavy, by whose kind permission I have made the following extract from the notes which were taken during her stay in the hospital:

She had enjoyed the best of health all her life, and had suffered from nothing more serious than some vaginal discharge and irregularity of menstruation. She had been married ten years, and had had neither children nor miscarriages. Three weeks before admission she was in her ordinary health, when suddenly she felt giddy, faint, and very sick. These symptoms passed off, but returned with equal suddenness on the following day. She likewise had twitching of the left arm and left side of the face, she

foamed at the mouth, was generally convulsed, and lost consciousness. She remained unconscious for four days, and on coming to herself found that she was completely paralysed and could feel nothing on the left side. She stated that little, if any, change had occurred in her condition up to the time of her admission into the hospital.

It was then found on examination that she was completely paralysed in the left arm and leg; the left angle of the mouth drooped, and the tongue was protruded to the left. On frowning and closing her eyes the muscles on the right acted much more energetically than those on the left, and when she whistled or laughed the mouth was drawn to the right.

In addition to this it was found that there was dimness of vision in the left eye almost amounting to complete blindness, though the patient said she saw perfectly before the attack. Hearing was good in the right ear, but almost absent in the left. Common sensation and taste existed on the right half of the tongue, but not on the left, and there was complete general anæsthesia of the left half of the body, affecting both the limbs and trunk. The sphincters were under the patient's control. The muscles of the eyeball were unaffected, the pupils equal, and the optic discs normal. Speech was but slightly altered. A systolic murmur was heard all over the cardiac area. Pulse was 76 and weak, and the temperature on both sides about equal. The urine was normal.

No marked improvement was noticed in her condition until March 15th, *i.e.* about four weeks after her illness commenced, when there was some evidence of returning sensation, the sight of the left eye was much improved, and the tongue diverged less to the left.

On March 20th she could taste and feel with either side of her tongue, but both sensations were less distinct in the left half than in the right.

On March 24th it was noted that she was irritable, stupid, remembering but little that was told her, but

having a much better memory for distant events. The anæsthesia of left side was less marked.

On April 1st she could execute some slight movements with her leg, and her general health was good.

On April 3rd, *i.e.* about six and a half weeks after the commencement of her illness, there was still more improvement in the power of the left leg, but the arm was as motionless as at first. Sight and hearing were completely restored.

After this changes occurred but very slowly. The arm was found on May 10th to have gained a little power, and sensation had quite returned all over the left side.

On May 31st she was getting about a little by herself, as the leg was much stronger, though the left arm was almost powerless.

On June 14th the patient returned home, about four months after the commencement of her illness, with the left arm almost useless, but with very fair power in the leg.

Seven years later, on May 7th, 1883, the patient, æt. 41, was admitted into St. Thomas's Hospital under the care of Dr. Harley, on account of difficulty of breathing and præcordial pain. She was thin, breathing rapidly, and expectorating whitish mucus. All over the cardiac area was heard a loud double murmur, most intense just to the left of the sternum. There were also signs of general bronchitis and of œdema of the base of the right lung. The liver was somewhat enlarged, the bowels constipated, and the urine contained albumen. The arteries were thick and the pulse 104.

Dr. Hadden, the registrar, made the following note :

"The fingers of the left hand are partially flexed on the palm and decidedly stiff. The skin over the backs of the fingers is whiter and more glistening than it is on the right hand. The grasp on the left is feeble and there is rigidity of the flexors of the forearm and arm. The tendon-reflexes are very brisk in the left, but are hardly obtainable in the right arm. The left leg is somewhat

rigid, the patella tendon-reflex brisk, and there is slight ankle-clonus. The tongue is protruded straight. Slight paresis is observed in the muscles on the left side of the face. There is no loss of sensation. On casual examination at the bedside the left eye appears to be sound, and there is no hemianopia or colour-blindness. Tested with a watch, hearing found to be sharp and equal on the two sides."

The patient died somewhat suddenly on May 17th.

The husband informed me that from the period of her attack, seven years before her death, she had been weak-minded and queer, doing unaccountable things such as she had never done before, but that she remained a good-tempered, hardworking, and affectionate wife.

On *post-mortem examination* marked aortic disease (ulcerative endocarditis) was found, and there was great cardiac hypertrophy, the heart weighing $17\frac{1}{4}$ oz. The lungs were hyperæmic and oedematous at the base, and the lower portion of the right was semisolid.

The liver showed slight congestion in the centres of the lobules ("nutmeg").

The kidneys weighed 11 oz., the capsule was thick and adherent, the substance very firm, and the surface granular.

The spleen was hard and its capsule thick.

Brain.—Great excess of subarachnoid fluid was present, which dripped freely away during the removal of the brain from the cranial cavity. In the region of the right temporo-sphenoidal lobe and inferior parietal convolutions the membranes were bagged out with clear serum, and there was evidently some defect in the substance of the brain at that spot. On rough examination it appeared that the greater part of the temporo-sphenoidal lobe, together with the convolutions which form the upper margin of the Sylvian fissure, had been absorbed, and that nothing remained but brownish-yellow *débris*. The uncinate and superior occipito-temporal gyri appeared to be normal. All the cerebral nerves appeared to be similar

on the two sides. The ordinary descending sclerosis of the postero-lateral region of the spinal cord and of the column of Türk could be seen.

After the brain had been hardened in alcohol a more careful examination of it was made.

It was seen that the right hemisphere was very much smaller than the left, and the reduction was rather in bulk than in length; the extremities of the two hemispheres were nearly level. The transverse diameters, however, were very different. In the region of the fissure of Rolando the left hemisphere measured two and a half inches across, the right an inch and a half. The vertical measurement through the right hemisphere was also much less than that through the left.

The convolutions affected were those supplied by the Sylvian artery, viz. the inferior frontal, the external portion of the orbital, the lower half of the two central convolutions, the inferior parietal lobule, the convolutions of the island of Reil, the angular gyrus, the inferior and middle temporo-sphenoidal, and part of the inferior occipito-temporal convolutions.

These convolutions had completely disappeared, and a depressed, ill-defined, loose mass of a yellow colour remained. This consisted of the pia-arachnoid membrane, vessels, and shapeless granular *débris*, the relics of better things.

The two frontal convolutions which remained were smaller than those of the opposite side, but otherwise appeared to be unchanged. The upper halves of the two central or ascending convolutions were very much atrophied, but they were not completely destroyed like the other parts supplied by the middle cerebral artery.

The parieto-occipital fissure was three quarters of an inch in advance of its fellow, *i.e.* three quarters of an inch nearer the anterior extremity of the hemisphere, but the occipital lobe on the right was certainly not smaller than that on the left. It had apparently merely come forward to fill up the gap caused by the atrophy of the central

convolutions. The right half of the cerebellum appeared to be somewhat smaller than the left.

The optic thalamus on the right was much smaller in all dimensions than its fellow on the left. The anterior portion of the corpus striatum on the left was little if at all larger than that on the right, but this may have been due to a reduction in size of the left nucleus caudatus from disease, as there was an old cicatrix in it seen on section. The right lenticular nucleus was very markedly atrophied. Both corpora quadrigemina were smaller on the right side than on the left. The right half of the pons and the right pyramid were much reduced in size.

On examining a horizontal section passing through the island of Reil, corpus striatum, and optic thalamus on the two sides, and exposing the third and lateral ventricles, it was seen that the measurement from the intra-ventricular aspect of the basal ganglia to the outer surface of the convolutions of the island of Reil on the right was not much more than one third of that on the left, and that the intra-ventricular parts both of the corpus striatum and of the optic thalamus had suffered least.

The anterior cerebral artery on the right as far as the anterior communicating artery was larger than that on the left, beyond that point they were almost equal.

The Sylvian artery on the right and some of its branches contained rather hard red clot, some were empty. Most of those on the left side were empty.

Remarks.—This case is clearly one of embolism of the right middle cerebral artery occurring seven years before death, and resulting in subsequent absorption of those parts of the brain which are supplied by it. The points of greatest interest appear to be :

1. The complete absorption of so large a portion of one cerebral hemisphere without fatal results, the patient being left a useful member of society.

2. That although there was sudden loss both of motion and of special as well as of common sensation on the opposite side of the body, the loss of motion alone was

permanent ; while the lesion of those parts, which the early symptoms proved to be sensory in their function, did not give rise to an incurable hemianæsthesia. On the contrary, the patient gradually and completely recovered common sensation, sight, hearing, taste, and smell, though loss of power remained.

The great destruction of the basal ganglia and internal capsule, as well as of many convolutions which are supposed to have special functions, renders this case useless for purposes of cortical localisation. Still some important conclusions may be drawn from it, viz. :

1. That if the angular gyrus and superior temporo-sphenoidal convolution be respectively connected with sight and hearing on the opposite side of the body, their destruction does not involve permanent loss of these special senses. Such an inference agrees with the results of experimental removal of the angular gyrus, an operation which has been found to produce crossed amblyopia, from which the animal soon recovers.

2. That each hemisphere *is* specially connected with the sight of the opposite eye. In a recent paper by Dr. Allen Starr,¹ on the visual area in the brain, the writer adopts the statement of Mauthner, made in 1881, that "there is no case well authenticated in which lesion of one hemisphere has produced blindness in the opposite eye ;" and he concludes that "when a lesion of one hemisphere involves the optic fibres, at any point, partial blindness of both eyes, and not blindness of the opposite eye is produced."

Although I have seen cases where hemiplegia with hemianæsthesia including loss of sight and other special senses occurred on the same side of the body, and where a lesion of the opposite hemisphere appeared to be the cause of all, I have never before had the opportunity of verifying the fact at a post-mortem examination. As very careful notes of this case were made at Guy's, and on examination

¹ 'American Journal of the Medical Sciences,' January, 1884: abstract in 'Med. Times and Gazette,' March 22nd, 1884.

the left eye was found to be amblyopic and the right not, the conclusion that each hemisphere has a more special connection with the opposite retina than with that on the same side seems to me to be legitimate.

3. The case also supports the conclusion which other clinical and experimental observations very strongly suggest, that sensation—whether common or special—on each side of the body is not so indissolubly connected with certain definite areas of the opposite hemisphere as is the case with motion. For the patient gradually recovered from her hemianæsthesia, notwithstanding the destruction of those regions, disease of which originally gave rise to it; a fact which shows that other parts, either of the same or of the opposite side of the brain, were capable of completely restoring the lost functions.

It may be said that this is not a necessary inference with regard to common sensation, since the hippocampal convolution was intact and a sufficient number of conducting fibres may have so far recovered that their functions could be re-established. Such an objection, however, is not valid as regards sight and hearing, since the convolutions specially connected with these senses were destroyed.

DESCRIPTION OF PLATES VIII AND IX.

Embolism of the Right Middle Cerebral Artery producing Left Hemiplegia and Hemianæsthesia (SEYMOUR J. SHARKEY).

PLATE VIII.

Fig. 1.—View of the Vertex of the Brain.
 „ 2.—View of the Base of the Brain.

PLATE IX.

Fig. 1.—Lateral view of Left Hemisphere.
 „ 2.—Lateral view of Right Hemisphere.

Fig. 1.

Fig. 2.

Fig. 1.

Fig. 2.