A CASE OF OCCLUSION OF THE RIGHT POSTERIOR INFERIOR CEREBELLAR ARTERY.

BY D. R. GOWLER AND B. M. HOPE, LONDON.

CASES of occlusion of the posterior inferior cerebellar artery, if somewhat rare, are always interesting. Not a few problems connected with the localization of function in the medulla and pons are still incompletely worked out, and the peculiarly limited nature of the lesion in some cases of this condition serves to lend precision to our knowledge of the brain-stem.

The case described below came under observation some time after the acute onset of symptoms, and in this respect some of the signs often accompanying the disease have been but faintly marked; on the other hand, the relatively unchanging residuum furnishes us with an excellent opportunity of determining the symptomatology of strictly unilateral lesions of the bulb.

We wish to acknowledge our indebtedness to Dr. Kinnier Wilson for his assistance in investigating the case, which came under his notice in the Neurological Clinic at King's College Hospital on January 19, 1923, and which he gave us permission to utilize.

History of Present Illness.—The patient, a married woman of fifty-three, was known to have had valvular disease of the heart for at least five years.

In April, 1922, she suddenly and without previous warning became acutely giddy and faint one evening, felt as though the right side of her face were 'screwing up,' and immediately lost consciousness, a state which lasted for several hours. On regaining consciousness she vomited continuously, was unable to speak, felt acutely giddy and kept turning to the right. She also seemed to be unable to see properly. There was, however, neither headache nor tinnitus.

About a week later her vision improved materially, no double vision having occurred at any time. Her voice also improved, though it is still hoarse.

About two months ago, or more, the patient noticed a tingling, burning sensation over the whole of the left side of the body and left limbs, and on both sides of her face. This has been especially painful round the right eye and the mouth and in the tongue. From the time of the original ictus she has had difficulty in swallowing solids, and still

has to "wash her bread and butter down with tea." In walking she still edges to the right, but as she never walks without help she has never actually fallen. At no time has there been any paralysis in the limbs.

Present Condition on Examination.—**Cranial Nerves.** 1. No defect on either side.

2. Optic discs clear.

3, 4, 6. No nystagmus in any direction. The pupils are of medium

FIG. 1.—Subjective paræsthesiæ of "tingling" and "burning."

FIG. 2.—Diminution of tactile sensibility.

size, the right distinctly smaller than the left; both react to light, but the former does not dilate well with shading; there is some ptosis of the right upper eyelid and some enophthalmos of the right eye.

5. Motor part normal. For sensory, see below.

7. No asymmetry in the upper part of the face; doubtful difference in the lower part, the teeth being sometimes shown better on the right side, apparently.

8. No tinnitus or deafness. On rotation tests to the right, duration of nystagmus forty-six seconds, to the left, thirty, the normal being in each case twenty. Excessively giddy after rotation to the right.

9. No anæsthesia of the pharynx to touch, but distinct diminution to pin-prick on the right. Difficulty in swallowing solids.

10. Paresis of the right half of the soft palate, and complete paralysis of the right vocal cord.

11. Normal.

12. Tongue is protruded straight.

Special Senses. — Taste. Sugar and salt not recognized on the

FIG. 3.—Complete loss of pain sensibility.

FIG. 4.—Loss of appreciation of cold stimuli.

right half of the tongue, either anteriorly or posteriorly. Left side of tongue normal.

Motor System.—No limb paralysis or paresis. No inco-ordination shown in finger-nose, knee-heel, or finger-finger tests. No dysdiadochokinesis. In walking, patient tends always to the right, moves slowly, and not without aid.

Reflexes. — Arm-jerks present and equal; knee- and ankle-jerks moderate, and equal on the two sides. Double plantar flexor response.

Sensory System. — *Subjective.* Subjective sensations of tingling and burning over the whole of the left side, including the face, head, and neck, and over the right side of the face, in the mouth, and in the tongue. This paræsthesia is particularly acute round the mouth and the right

FIG. 5.—Diminution of painful pressure over right side of face.

face, right half of tongue, and left half of body to neck (*Fig. 3*). Prick everywhere felt as pressure. Pressure on the right eyeball not painful. In the right half of buccal mucosa and right side of the pharynx pin-point sensation is much reduced but not lost. Localization is everywhere correct.

3. Temperature. Heat stimuli (about 45° C.) recognized everywhere, on both sides of face and body. Cold (about 7° C.) completely lost over left half of body, and left limbs, except towards the upper limit of body (*Fig. 4*), where it is felt as 'a little cooler' than the hot tube. In addition, in this area occasional complete mistakes with cold tube made (about one in four trials). Localization correct in every instance.

4. Tactile discrimination. Equal on the two sides over the face and body. No constant differences found as between the right and left limbs.

5. Deep sensibility. Is able to recognize small movements of any joint on either side. No loss of sense of position or of passive movement.

6. Deep pressure pain. Tested with Cattell's algometer, greater pressure required to produce pain on the right half of the face and the left half of the body. In some readings the difference was very slight indeed, in others it was more noteworthy (*Figs. 5 and 6*).

eye. Over the latter areas pressure or rubbing intensifies the sensation, which becomes painful (*Fig. 1*).

Objective. — 1. Touch. Touch, tested with cotton-wool, is diminished but not lost over the left half of the body to the neck (not the left face) and over the right half of the face (*Fig. 2*). Localization is always correct. The corneal sensitivity and reflex are much reduced on the right. No impairment of touch over the tongue, buccal mucous membrane, or pharynx. Nasal mucosa less 'tickly' on the right.

2. Pain. Complete loss of pain sensibility over the right side of the

FIG. 6.—Diminution of painful pressure over left half of body and left limbs.

7. Pallæsthesia. Diminution of vibration-sense over the whole of the face and head and over the left half of the body. On the right side, the 'trembling' sensation is everywhere recognized.

8. Sense of weight. Tested with different coins, no recognizable differences between the two sides.

9. Stereognosis. Present and normal on the two sides.

Cervical Sympathetic.—Paralysis of the right cervical sympathetic, with narrowing of the palpebral fissure, myosis, and enophthalmos on that side. No difference, however, in sweating or flushing as between the two sides of the face, except possibly that the right eye contains more moisture than the left and tends to 'weep' with somewhat greater freedom than the other.

Heart.—Long rumbling presystolic murmur at the apex, with accentuated pulmonary second. Systolic B.P. 140 mm. No sugar or albumin in urine; blood, Wassermann test negative.

COMMENT.

There can be no doubt, we think, that this case belongs to the group of posterior inferior cerebellar artery occlusion. The chief residual symptoms, viz., crossed anæsthesia, paralysis of the motor tenth (palate and vocal cord), and central paralysis of the cervical sympathetic, point unmistakably to involvement of the lateral aspect of the medulla in the vicinity mainly of the formatio reticularis. In view of the endocarditis from which the patient has been suffering for some years, and of the abruptness of onset of the attack, we regard the pathological lesion as in all probability embolic.

If not entirely classical in its symptomatology, the case none the less presents the usual salient features of the symptom-complex of lesions in the vicinity mentioned. Brief allusion may be made to some of these.

1. The persistent titubation or lurching to the right may be set down to implication of the vestibulospinal tract; it is not likely the lesion has spread so far forwards as to have involved the neighbourhood of the group of nuclei from which the path descends. There is no sign, further, of concomitant disorder of the auditory part of the eighth nerve. Some degree of vestibular impairment is indicated by the result of the rotation tests, however, and vertigo has throughout been prominent in the picture; it is a question, therefore, whether all can be attributed to the vestibulospinal tract, though there is no doubt of the disturbance of the vestibular mechanism.

2. In this connection the relative absence of cerebellar symptoms on the right side is noteworthy, since crossed olivo-cerebellar fibres run

through the region presumably diseased, while the spino-cerebellar are to be found at the margin of the bulb at the same level. Apart, however, from the fact that at the outset cerebellar symptoms might have been present, subsequently to recede (a not infrequent occurrence), it should be remembered that in some cases examined pathologically (e.g. one recorded by R. M. Stewart¹) the softened area has not always extended actually to the edge of the medulla, being situated slightly more mesially. Hence the spino-cerebellar tracts might escape.

3. The loss of taste on the right side of the tongue, anteriorly and posteriorly, may be assigned to implication of the nucleus solitarius in the softened patch. As a rule it is just on the margin of the area involved by occlusion of the posterior inferior cerebellar, and may or may not be caught. The work of Nageotte,² it may be remembered, has shown that the nucleus solitarius (or gustatorius) receives below a large number of fibres coming from the trigeminal nerve, hence some at least of the loss of taste in our patient's case may have had a trigeminal origin.

4. The paralysis of the cervical sympathetic on the same side as the lesion demonstrates an uncrossed connection with the spinal centre of Budge at the cervico-dorsal junction. It is of interest mainly because there is good clinical evidence here of dissociation of function at a level corresponding to the mid-medulla. No difference in sweating or flushing on the two sides of the face was observable, whereas in other instances of the syndrome (e.g. that recorded in detail by Kinnier Wilson³) one side of the face has been bathed in sweat while the opposite one has been dry. On the other hand, we should like to refer again to the fact that in our patient the right eye was always more moist than the left, though no facial paresis was present. The sympathetic supply of the lachrymal gland is from the cervical sympathetic, its autonomic (para-sympathetic) supply *via* the sphenopalatine ganglion (Higier⁴); one might suppose that in some way the dryness which is said to follow paralysis of the cervical sympathetic may on occasion be over-compensated.

5. The homolateral paralysis of palate and vocal cord (syndrome of Avellis) is caused by impairment of function of the nucleus ambiguus or the efferent fibres from it.

6. We cannot do more here than allude to some of the interesting sensory phenomena exhibited in our case.

The relative preservation of tactile sensibility over the right face, and the correct localization of touches, suggest that the fibres conveying these impulses do not pass into the descending root of the fifth, or at least cannot go far down; they may proceed directly to the chief sensory nucleus of the nerve.

The loss of pain sensibility over the right face, coupled with the normal condition of thermal sensibility, indicates a dissociation of these functions in the descending root of the fifth, or, conceivably, in the

quinto-thalamic path derived therefrom; we cannot say which in the present instance is the more likely.

As for the condition of sensibility on the left side of the body, the complete preservation of appreciation of warm stimuli and the loss of cold must similarly be taken to indicate the possibility of dissociation of thermal sensation in the spino-thalamic tract or lateral lemniscus, as has, indeed, been noted often enough previously. The question of localization in the medullary part of the spino-thalamic path is very difficult, as Bergmark⁵ has recently emphasized; perhaps our case may be taken to suggest that pain is most mesial, then comes cold, then comes heat laterally. Yet Bergmark very justly says a dorso-ventral localization ought also to be considered.

The existence of 'burning' paræsthesiæ over the left half of the body, in the area where, objectively, appreciation of the opposite sensation, viz., cold, is lost, is of interest in view of the speculation of Hughlings Jackson that there is in such cases an 'antagonism of corresponding opposites'; loss of one leads to over-accentuation of the other.

The relative preservation of touch and of its normal localization on the left side, as of muscular sense, indicates that the median fillet is intact. The diminution of the vibration sense, on the other hand, is interesting, since our case possibly suggests its localization with pain and temperature in the lateral fillet, contrary to what might have been expected.

REFERENCES.

- ¹ STEWART, *Journ. Ment. Science*, 1915, July.
- ² NAGEOTTE, *Rev. of Neur. and Psychiat.*, 1906, iv, 473.
- ³ KINNIER WILSON, *Proc. Roy. Soc. Med.*, 1909 (*sect. Neurology*).
- ⁴ HIGIER, *Vegetative Neurology*, New York, 1919.
- ⁵ BERGMARK, *Upsala Lak. Forhandl.*, 1921, xxvi, H. 5-6.