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A CASE OF OBLIQUE HEMIANOPIA FROM WOUND OF OPTIC CHIASMA.

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The patient, aged 24, was wounded on January 5, 1916, and came under observation a week later. He had multiple shrapnel wounds of both upper limbs and of the right lower limb. In addition, one metallic fragment had entered through the right upper eyelid, destroying the right eye and lodging within the cranium, where radiography showed it to be about ¼ inch above and ½ inch in front of the upper limit of the sella turcica. It had crossed the mesial plane and was lying ½ inch to the left of the middle line (see figs. 1 and 2).

When hit, he immediately became unconscious and had a subsequent period of amnesia which lasted for several weeks, throughout the attack of septic meningitis which followed. Two days after his injury, on board the hospital ship, it was noted that he was completely blind and that the pupil of the uninjured left eye was widely dilated and insensitive to light.

The signs of severe meningitis rapidly increased, with headache, delirium, pyrexia and head-retraction. For the first ten days the patient seemed moribund, and minute observations on his eyes seemed impossible. He then began to improve, and was more carefully examined on January 17, i.e., twelve days after the injury. On this day the temperature, which since admission to hospital had been swinging between 100.8° and 103.4° F., was 101.8° F. The pulse, which had varied from 88 to 100, was 96. The patient was now able to reply intelligently to questions, although still at times mildly delirious. He complained of headache and cervical rigidity. The right eyeball was completely disorganized and suppurating. The left eye had no perception of light, and its pupil was widely dilated and insensitive. The left optic disk and fundus were normal. In particular, there was no pallor of the disk and no suspicion of optic neuritis. The cranial nerves were otherwise normal. There was no sensory or motor paralysis of the face, trunk or limbs. The knee-jerks and ankle-jerks were normal. The plantar reflexes were of the normal flexor type. Kernig's sign was well marked. The cerebrospinal fluid was opaque and milky; on standing, it showed a thick deposit of pus. The meningitis gradually subsided during the next six weeks under treatment by urotropine internally, together with lumbar puncture on alternate days, the cerebrospinal fluid becoming normal.

On January 29 the right eye was excised. The globe was found to be full of blood-clot. There was no obvious suppuration within the orbit.
On February 4, i.e., a month after the injury, it was observed that some vision had returned in the left eye, in the nasal half of the field, so that the patient could distinguish hand-movements close to the eye.

On February 18, when the meningitic symptoms had subsided, and the cerebrospinal fluid had become almost clear, the hemianopia of the left field was confirmed.

From February 24, the temperature remained steadily normal. On March 1 the lumbar punctures were discontinued.

On March 9 a more careful examination of the left eye was made. The optic disk was now diffusely pale and atrophic. The left pupil was widely dilated, and showed a typical hemiopic reaction, i.e., when a pencil of light was thrown on the sensitive temporal half of the retina, the pupil contracted, whereas a similar pencil of light thrown on to the blind nasal half of the retina produced no reaction. The boundary between the blind and the seeing halves of the visual field was not vertical but oblique, running through the 120° meridian (see fig. 3).

On March 13, this obliquity of the hemianopic boundary was confirmed and a slight gain of vision was detected in the blind half of the field, close to the fixation point (see fig. 4). On this day the vision was 15/15.

By March 21 the vision had further improved, to 6/12, and the visual field had also extended slightly more into the blind area, both horizontally...
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Fig. 4.

Fig. 5.
outwards and also, in the 105° meridian, downwards and inwards (see fig. 5), where the field had widened from the 8 circle to the 30 circle. Moreover, there was now a little vision directly downwards, and even a trace in the 75° meridian, downwards and outwards.

On March 23, the pupillary reaction was no longer typically hemiopic, for now the pupil contracted to light thrown in from either side, although more briskly to light from the seeing half of the visual field.

Lesions of the visual path have been by no means uncommon during the present War. We have ourselves seen numerous examples of cortical and of sub-cortical lesions and of lesions of the optic radiations. Such cases present features of interest which have been studied by many observers. Lesions of the optic tract, which are commonly associated with signs of pyramidal affection from injury to the adjacent crus cerebri, are far less common. An excellent example, however, has been published by Marie and Chatelin (Revue neurologique, 1915, p. 1232). Lesions of the chiasma itself, without implication of the long tracts of the brain-stem, are still rarer, and this must be our excuse for recording a single case.

In the foregoing case, the presence of an apparent left-sided hemianopia seemed at first to indicate a simple lesion of the right optic tract, somewhere behind the chiasma. The occurrence of the hemiopic
pupillary reaction further limited the probable position of the lesion to a spot somewhere below the primary reflex visual centre in the right external geniculate body. Further observations, however, showed that it was not so simple as this.

Let us recall, for a moment, some points in the anatomy of the visual path. The fibres from each optic nerve run backwards to the optic chiasma. Here a partial decussation occurs (see fig. 6), so that the fibres from the right halves of both retinas, i.e., from the left halves of both visual fields, after traversing the chiasma, emerge behind it to form the right optic tract. Similarly with the fibres from the left halves of the retinae, which enter the left optic tract. The macular or central visual fibres from the macula lutea of each eye are distributed in both optic tracts. As the chiasma is approached, the fibres from the nasal halves of the retinae (temporal halves of the fields) tend to become ventral in position, while those from the temporal halves tend to become dorsal. The macular bundle occupies a central position. The optic tract, emerging from the chiasma behind, contains visual fibres from the whole contra-lateral half of both visual fields, including the central fixation-point of each eye. It winds backwards, around the outer side of the crus cerebri, to the primary optic centre in the external geniculate body and anterior corpus quadrigeminum. The farther backward course of the visual fibres to the cortical half-vision centre in the calcarine cortex does not concern us here.

In our case, the apparent left-sided hemianopia, together with the hemiopic pupillary reaction, seemed, at first sight, to point to an ordinary straightforward lesion of the right optic tract. More careful study, however, showed that this was not the case. Firstly, the boundary between the blind and the seeing area of the visual field is not vertical, as in an ordinary tract lesion, but oblique. That is to say, both lateral halves of the visual field are affected, including nearly the whole of the left field and a small sector of the right. The incompleteness of the affection of the left field is further evidenced by the fact that there is also a small area of recovery extending outwards from the fixation-point.

Fig. 6 is a diagram indicating the position of the lesion in this case. The lesion affects mainly the fibres destined for the right optic tract. Some of them, however, have escaped, viz., those corresponding to the upper and mesial sector of the blind field, also a smaller number corresponding to the area just above the horizontal plane, directly outwards from the fixation-point. These latter fibres, from their central position in nerve and chiasma, would be well protected from injury. In addition, a number of fibres destined for the left optic tract are also implicated, viz., those corresponding to the lower and mesial sector of the right half of the visual field.