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In each case (a) table exhibits the average temperature. The (b) table exhibits the monthly percentage of a particular organism on the monthly total of all micro-organisms found; that is to say, it shows what frequency the particular organism exhibits as compared with the total number of micro-organisms found. The (c) table exhibits the monthly percentage of a particular organism on the total of all micro-organisms found during the year; that is to say, it shows the seasonal variation as compared with all other micro-organisms. The (d) table shows in another form to that exhibited in the (e) table the varying seasonal incidence of the particular organism.

The gonococcus is seen to be the main cause of the increase of acute cases of conjunctivitis (Table V), and the increases appear subsequent to the rise of temperature, although the upward trend of the gonococcal curve continues disproportionately long as compared with that of the temperature; also the maximum amount of gonococcal conjunctivitis is found in October, while the maximum temperature is reached in July.

The conjunctivitis due to the Weeks' bacillus certainly increases with the spring rise in the temperature, but its maximum incidence is found in April or May and not in October as we have seen is the case with the gonococcus.

Conjunctivitis due to the Morax bacillus does not vary so much during the year in its incidence as the above-mentioned organisms. It is, however, somewhat more prevalent in the early part of the year, and comparatively to the other organisms, as seen in Table VII, is much more frequent at this time.

The conclusions arrived at from these curves are not materially different from those published in my previous reports.

EYE SYMPTOMS AS THE ONLY INDICATION OF FRACTURED BASE OF THE SKULL

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EVERY ophthalmic surgeon has met with patients in whom eye symptoms formed part and parcel of those which, taken as a whole, indicate a fractured base of the skull. The object of the present communication is to draw attention to a group of cases in which the injury to the skull is shown exclusively or chiefly by the appearances of the eyes in conjunction with the history. My meaning may be rendered clearer by a perusal of the following four cases, from which care has been taken to exclude any direct injury of the eyes
themselves. It may be urged as telling against the acceptance of my interpretation that the patients recovered from the injury. This objection would have had more weight once than it has nowadays. Apart from many cases in which all the symptoms of fractured base existed and yet did not prove fatal there is abundant anatomical proof that such fractures are susceptible of union. For example, T. Holmes gives illustrations of united fracture of each of the fossae of the base of the skull obtained from patients who died from other causes. If my views be correct it is important that this group of cases should be recognized by ophthalmologists under whose observation they naturally come.

1.—Direct injury to the vault of the skull followed by extensive subconjunctival ecchymosis.

A cabdriver, aged 27 years, came under my notice with an extensive subconjunctival ecchymosis involving chiefly the lower part of the right eye. The posterior limits of the effusion could not be defined. A line of ecchymosis was also present beneath the skin of the inner part of the lower eyelid. V. was 6/6, and the fundi were normal. The patient affirmed that he first noticed the appearance of the right eye (which had become worse since) four days after he had been thrown upon the right side of his head from the seat of his hansom, and in confirmation of his statement there was an extensive bruise of the right parietal region. After the accident he felt dazed for a time but retained consciousness, and there was no bleeding from the ear, nose, or mouth. He complained, however, of continuous headache. The patient made a good recovery after about three weeks' rest in bed. Despite the absence of general symptoms I felt justified in diagnosing a fracture of the anterior fossa of the base of the skull.

2.—Retinal haemorrhages in one eye with history of a recent injury to the vault of the skull.

A man of 24, a clerk in a shipping office, came for advice on account of his eyes which he said ached after work. The underlying condition, one of slight hypermetropic astigmatism, was estimated while the eyes were under the influence of homatropin and cocain. During the course of the routine examination it was found that the fundus of the right eye was bespattered with retinal haemorrhages, many of a flame-like appearance. The man looked in good health and no obvious cause could be found to account for the retinal changes. A medical colleague (the late Dr. G. W. F. Macnaughton) reported that the patient's cardio-vascular and renal systems showed no departure from normal. Further enquiries

* The mortality from fractured base in English practice is probably under 50 per cent. (An Index of Prognosis, edited by A. Rendle Short, 1918, p. 313).
brought out the fact that about a fortnight previously the man had sustained a severe blow from a fist upon the right side of the forehead in the course of a drunken brawl. The retinal haemorrhages were slowly absorbed.

3.—**Paresis of one external rectus and atrophy of the optic disc on the same side following a fall upon the forehead.**

A lad of 7 years was seen at the Queen’s Hospital for Children on April 22, 1909. The left eye was convergent 25° and the outward excursion of that eye was somewhat reduced. V. = p.l. The pupil was dilated and sluggish to light. The optic disc was white and sharply defined and the retinal vessels, as compared with those of the other eye, were small, but there was no ophthalmoscopic evidence of antecedent neuritis. The defect in sight of the right eye (V. 6/12) was due to an error of refraction, and the optic disc of that eye showed no morbid changes. The functions of the facial nerves were unimpaired. The history was to the effect that about two months previously, while running in a dark passage, the lad stumbled and fell heavily upon his forehead. The skin was grazed, but he did not lose consciousness, and as no immediate symptoms followed the fall, not much importance was attached to the matter by the parents. Some days afterwards (it might have been a fortnight, the mother thought) the left eye was noticed to turn inwards. When the patient was seen some months later the eye conditions were found to have undergone no change.

4.—**Paresis of the right external rectus after a blow upon the right temple; operation; recovery of binocular vision.**

A boy, aged 16½ years, while stooping under a marble top table, raised his head suddenly, and in doing so struck his right temple sharply against the corner of the table. He did not lose consciousness, and the accident was not followed by the escape of fluid from ear or nose. Four days later the right eye was observed to turn inwards. When I saw the lad, eight days after the injury, there was paresis of the right external rectus with convergence of the affected eye and homonymous diplopia, increased on attempting to look towards the right. The fundi were normal. The condition was treated with ascending doses of potassium iodide for upwards of a year without benefit. The diplopia was not always present but usually came on several times a day. Seventeen months after the accident the affected eye was convergent, 12° to 15°; abduction could be carried out until the external margin of the cornea was almost in contact with the outer canthus; and diplopia was present only on turning the eyes to the right. I suggested that operation might be useful, and advised that Mr. W. T. Lister’s opinion be taken on the point. That gentleman agreed that operation would
be likely to improve the patient's appearance, but after investigating the condition of binocular vision with the amblyoscope, he thought that it might be followed by a very troublesome diplopia. In deference to his views I waited for upwards of a year but then, as the squint was increasing and the patient was much troubled with diplopia, I divided the right internal rectus and shortened the right external rectus and its overlying conjunctiva. As a result the eyes became straight and no further complaints were made of double sight. In fact, binocular vision was regained. The patient entered the Army as a private at the beginning of the war and is now serving in Salonika with the rank of captain. I saw him recently (August 15, 1918), and he made no complaint of his eyes.

Remarks.

Cases similar to No. 3, where a blow upon or a wound of the forehead is followed by a defect in sight, were known to Hippocrates, and discussed by many of the earlier writers, as Sabatier (1791), Beer (1813), Wardrop (1818), Mackenzie (1830), and Walther (1840), to name only a few among many. The prevalent view was that in such cases an injury of the fifth pair acted sympathetically through the medium of the nasal branch. Mackenzie evidently doubted the truth of this explanation, and suspected that the injury had been responsible for a concussion of the eyeball or that it had excited disease within the cranium. At the same time he devoted a section of his famous book to a description of cases of "Amaurosis from morbid changes of the fifth pair of nerves." I need scarcely remind readers that in most instances fractures of the base of the skull are caused by indirect violence, and are in fact extensions downwards of fractures of the vault, such as may be assumed to have taken place in all my cases. The majority of these fissures pass through the middle fossa (in upwards of 82 per cent. in Hewett's analysis of 64 cases of fractured base). It was shown by the researches of Hölder how often these fractures involve the walls of the orbit. Thus, of 86 fractures of the base following shot-wounds of or falls upon the head, no fewer than 53 cases, or 61 per cent., presented a fracture of the orbital roof as well.* In many of these cases the optic foramen was involved. It was suggested by Berlin that the blindness consequent upon injuries of the forehead was caused by fracture of the optic foramen, whereby the optic nerve was directly injured.

As to paralysis of the muscles of the eye following fracture of the base of the skull, it will be noted that in two of the cases I report

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*Hölder's observations on this point were forestalled by those of Prescott Hewett, who wrote in 1853—that is, 27 years before Hölder's were published. Hewett showed that of 68 cases of fracture of the base of the skull examined after death, the upper wall of the orbit was more or less extensively broken in 23, or about one-third.
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(Nos. 2 and 4) the sixth nerve was involved. This agrees with the common experience of such cases. It was pointed out by Panas\textsuperscript{12} that this nerve is particularly liable to suffer in such injuries, since in part of its intracranial course it lies close to the apex of the petrous bone, and is accordingly apt to be damaged by fractures involving that part, a common event in fractures of the base. The point was also elaborated by Chevallereau, a pupil of Panas. Paralysis of the sixth nerve may follow the injury at once, or it may be delayed for a longer or shorter time. In the former case we may assume damage from splintered bone, and in the latter from the pressure exerted by blood-clot or callus. Paralysis of the sixth nerve appears to be commonly permanent. In cases described by Le Roux\textsuperscript{13} and Mardellis\textsuperscript{14} respectively, however, the condition underwent spontaneous cure.

It seems clear from a perusal of Panas's several communications\textsuperscript{15}, \textsuperscript{16}, \textsuperscript{17} that he recognized that a fractured base might be manifested by paralysis of the sixth nerve alone.

With regard to retinal haemorrhages, such as were present in case 2, it has been shown by R. A. Fleming\textsuperscript{18} that they are common when a fractured base is associated with much subarachnoid bleeding, and that when the latter is one-sided there is usually haemorrhage into one retina alone. Fleming regards the retinal lesions as of considerable value in the diagnosis of fractured base.

REFERENCES

2. Hippocrates. \textemdash Letter XIII, Art. 5.
7. Mackenzie \textemdash \textit{L.c.}, p. 126.
10. Berlin \textemdash \textit{Ibidem}.
11. Panas \textemdash \emph{Arch. d'Ophthalm.}, 1881, p. 3.
13. Mardellis \textemdash \emph{La Clinique Ophth.}, March, 1917.