ORGANIC LESIONS FROM SHELL CONCUSSION.

BY

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A LARGE number of cases of shell concussion have been reported since the beginning of the present war. As far as they concern the eyes, the main symptoms are: Impairment of sight, contraction of the visual fields, photophobia, and blepharospasm.

When these symptoms are noted with little or no evidence of injury to the eyes or neighbouring cavities, it is usual to regard them as functional—a form of traumatic neurosis—and in the majority of cases this view is correct.

It must not, however, be assumed that they are all of this nature, and it is the object of this note to draw the attention of the profession in general and military surgeons in particular to the possibility of such symptoms arising from more or less gross organic lesions. The lesions may be present without any superficial sign of injury whatever, or very gross changes may follow such slight surface injuries that it is impossible to regard the latter as the true origin of the organic lesions, and we are compelled to admit that they are probably concussion effects.

The following have been observed among the cases which I have examined during the last twelve months or so:

Hole at the Macula.

In one case the patient gave the history of having been knocked over by the explosion of a shell, and there was no sign that anything had struck him in the region of the head. In the second case the patient said he might have been shot, but there was no sign of a bullet wound or other injury. In both cases *x*-ray photography showed an absence of foreign bodies, and there was no evidence of fracture of the orbital walls.

Haemorrhages in the Globe: Ruptures of Choroid.

S. P. was admitted into the 2nd Birmingham War Hospital suffering from loss of sight and oedema of the face. There was also a wound, apparently superficial, of the right malar bone, which skiagraphy showed to be punctured, but there was no sign of any foreign body in the head and no wound of exit suggesting that it was a bullet wound. The patient could not enlighten us as to the nature of the projectile which struck him. The cause of the visual defect was found to be multiple ruptures of the choroid with haemorrhages all over the fundus and into the vitreous. Later it was noted that the discs became atrophic, although he still retains sufficient vision to get about.

The appearances of the fundi in this case were identical with those seen after the passage of projectiles of high velocity across the orbits behind the eyeballs.

Mr. Harrison Butler, at a meeting of the Midland Ophthalmological Society, showed a case in which the patient, who had been exposed to shell concussion in August, 1914, had lost the sight of the right eye. There were large membranous opacities in the vitreous the result of haemorrhage, the temporal vessels were reduced to white cords, apparently a little thicker and less defined than the vessels themselves, and the disc was atrophic. Vision = hand movements on the temporal side only.

Optic Atrophy.

Mr. Butler also showed a man suffering from atrophy of the optic nerve on the left side. He had been buried in a trench by the explosion of a shell. He was unconscious for eleven hours; when he recovered consciousness he found that he could not see with the left eye. At that time there was much swelling about the eye, but when admitted to the Birmingham Eye Hospital there was complete absence of any sign of injury. A case with similar history under my care showed optic atrophy and rupture of the choroid, but no sign of injury.

Another case under my care presented right optic neuritis and secondary atrophy with central choroiditis and vitreous opacities. The only injury was a small superficial wound of the upper lid. There was no fracture or foreign body shown by *x* rays. Atrophy of the optic nerve, presumably from haemorrhage into the sheath, has also been seen without any evidence of injury.

It is generally assumed, also, that intraocular changes only follow the passage of bullets of high velocity, when they pass through the orbital cavity. This is true in the main, but the following case shows that it is not always so.

Private H. was shot through the left cheek, the bullet passing through the left antrum and the nasal cavities, and emerging through the right zygomatic region. Vision was reduced to $\frac{3}{6}$ in each eye. The macular area in each eye showed marked oedema and the fovea in the left eye showed a red spot almost like the cherry spot of embolism of the central artery. Pigmentary changes in maculae followed.

We have met with other cases in which there is little or no evidence of injury, but which show gross changes such as dislocated lens and detached retina in the eye, but the histories of cases have not been sufficiently definite to ascribe these changes to concussion.

Shell shock also seems capable of bringing out latent ocular defects; squint and nystagmus have become manifest after shell fire, although the patients deny their previous existence.

The cases recorded will, I think, sufficiently indicate the necessity of investigating cases of "shell shock" very carefully in order to differentiate those that are functional from those that are due to organic lesions.

BILATERAL IRIDODIALYSIS WITH AMBLY-
OPIA AND CONTRACTED FIELDS DUE
TO EXPLODING SHRAPNEL.By F. D. BENNETT, M.R.C.S., L.R.C.P.,
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A PRIVATE, aged 37, came to the Royal Eye Hospital on June 12th, 1915. He states that he was wounded in the advance on Neuve Chapelle on March 10th by shrapnel exploding in mud, as far as he could judge some 4 ft. on his left front. He was completely blinded for the time, no doubt by the mud and debris thrown up, as well as the blood from the numerous lacerated wounds of the lids and forehead. From the field hospital he was taken to "E" and rested a night at "M" and "O" before joining the hospital ship *Asturias*. Thence he was conveyed to "N" where he arrived at the "W" hospital, March 16th, and remained till April 22nd.

On arriving at "N" he was unable to see at all, probably owing to extraocular inflammation of lids and forehead, which, judging by the scars, must have been very considerable. He began to see with his right eye after three weeks, and with the left after five, and then at times saw double.

He is a strong, squarely built, thickset, muscular man, with fair complexion and healthy appearance. On admission he had a somewhat dull, apathetic look. His mental cerebration was slow, and he was inclined to be querulous and sullen. Sense of taste, smell, and hearing were normal, and, as far as one could learn, not impaired since the accident. He is married and has three healthy children. He had never had any previous illness or affection of the eyes, was a moderate drinker, but a heavy smoker. There were numerous scars on the forehead, eyebrows, and upper lids, chiefly on the left side, one larger than the rest, involving the whole length of the upper lid, running from the inner canthus up and out to the left external angle of the frontal bone. The mobility of the lids was not impaired.

R.V. = $\frac{3}{6}$ c. + 1.0 d. L.V. = $\frac{3}{6}$, not improved.

There was well-marked horizontal astigmatism in both eyes, which on correction did not improve vision. The corneae were clear, and the conjunctivae and sclerotics presented no signs of injury; the anterior chambers normal in depth.

Right Eye.—Pupil of oblique oval shape, 2 × 3 mm. in diameter, with long axis from below in to above out, and parallel with small detachment of the iris for 2 mm. from its ciliary border on the upper and inner side. Reaction very sluggish to light, accommodation, and convergence. Consensual reflex slight. Lens and vitreous clear. Optic disc somewhat hazy and paler than normal; margins, especially the inner, ill defined, and slight oedema of the retina around the papilla. Surrounding vessels appear normal both in size and direction. At the upper and inner quadrant only are numerous foci of pigmentary

choroidal degeneration which seemed of doubtful traumatic origin. These have remained constant since the patient came under observation.

Left Eye.—Pupil circular, 3 mm. in diameter, larger than right. Reaction to accommodation and convergence sluggish, but doubtful to light. At the outer margin and slightly above horizontal meridian the iris is detached from its ciliary border for 2 mm., and shows an identical semilunar-shaped opening to the right eye. Optic disc somewhat paler than normal, with ill-defined margins. Surrounding retina shows some effusion. Red reflex present through openings in both irides, but equator of lens not visible.

He was not conscious of any increased illumination through the secondary pupils. There was no evidence of any hyphaemia when he came under observation. X-ray examination and Wassermann reaction gave negative results.

The fields were markedly contracted, especially for red and green.

The diplopia was not constant, and could not be elicited in examination by the ordinary methods. He stated that it was present at times when lying down in bed and described the one image as being lower than the other. Beyond this it was difficult to obtain information which could be considered reliable, but the evidence pointed to the eccentric pupil accounting for the condition.

The amblyopia, seemingly due to commotio retinae and functional disturbance, improved with rest and treatment, his general condition benefited, and his view of life became considerably more cheerful and intelligent.

Vision now: R. = $\frac{1}{2}$ c. disc $\frac{1}{2}$. L. = $\frac{1}{2}$ c. disc $\frac{1}{2}$.

The fields were taken on admission and twice since, and show no material improvement. This corresponds with Lister's observations on similar cases.

Monocular diplopia can now be elicited in both eyes, but it does not inconvenience him.

I cannot discover any recorded case of a similar binocular condition of the irides, traumatic or congenital. Parsons states that multiple dialyses occur, but presumably means of the same eye. Fuchs states that "he never saw them as a result of injury."

The peripheral zone of the iris adjacent to its ciliary attachment where it lacks the support of the lens behind, and is backed only by the zonule of Zinn, is admittedly the weakest, and the usual situation of these injuries.

The detachment in the left upper angle of each eye would be explained by a blow from the left and above. The head was probably held down in the act of running forward, or automatically ducked on hearing the scream of the shell, as in the case of bullets whistling above.

In the absence of other injuries

to the eyeballs the detachments were most probably due to sharp impacts through the upper lids, from lumps of mud and clay from the left front. This explanation would readily fit in with Arlt's explanation of the condition, which says: "The cornea being momentarily flattened, the circle described by the corneo-scleral border and the ciliary body, with which it is firmly united, is extended, whilst the sphincter iridis is contracted, the serrated connexion of the iris with the ciliary body is torn to a greater or less extent, and a second communication is formed between the anterior and posterior chambers."

I am indebted to Mr. Stroud Hosford for his opinion on the case, and the kind use of one of his beds.

Chart 1.—Fields: w, White; r, Red; g, Green. Size of object 5 mm. (June 14th, 1915.)

THE PROPHYLAXIS OF TETANUS:

A SUMMARY.

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IN the BRITISH MEDICAL JOURNAL, October 10th, 1914, a short and necessarily incomplete account of the use of tetanus antitoxin was given.

Since then many cases of tetanus have occurred, and many papers have been written on the subject, and a consideration of them should show us where our knowledge has made progress, and where it has been found wanting.

Owing, doubtless, to the exigencies of the times in which we are living, the writers, while expressing definite opinions, have given usually incomplete details of the results upon which their conclusions were based. This want of precision has tended to confusion, and has prevented in many instances the separation of those wounded who had a prophylactic injection of serum from those who had none. The value of the communications is thereby lessened, but in spite of this it is hoped that this further summary of the literature on the prophylaxis of tetanus may prove of interest and of use to those whose duties have not allowed them much time for reading during the past year.

PROPHYLAXIS.

In the *Memorandum on the Treatment of Wounds in War* (July, 1915) there are the following statements:

The prophylactic use of tetanus antitoxin is a proceeding of well established value.

Since, in the first two months of the war, more cases of tetanus occurred than had been anticipated either by ourselves or our Allies, it was decided to direct that a preventive dose of

serum should be given to every wounded man. The results have been excellent, and in the last six months there have been only 36 cases of the disease among those who received a preventive dose of serum within twenty-four hours of being wounded.

The preventive dose of 500 U.S.A. units should be given subcutaneously at a distance from the wound at the earliest possible moment. In severe wounds medical officers not infrequently give 1,500 units; there is no objection to this, but at the same time there is no evidence that the smaller dose is insufficient if given promptly.

Such has been the experience of the British army. Do the reports from other countries confirm it? Walther (1914) records that the action of prophylactic injections has been clear, although they could not in some cases be made until five to eight days after the wound. All the wounded in three wards and ten seriously wounded in another ward received each 10 c.cm. of antitetanic serum. Only one case had tetanus, and this came on the day after the injection—that is, before the serum could have produced its full effect. All the other cases of tetanus were observed among the wounded of three other wards in which prophylactic injections could not be given.

Hartmann (1914) at Besançon and Bourg met with 43 cases of tetanus among 3,373 wounded, and states that at neither of these places did a case occur among the men who had received an injection of antitoxin. He is of opinion that if a prophylactic dose of serum were given in all cases and repeated six to seven days later in anfractuous wounds tetanus would disappear as a complication of wounds.

Hufnagel (1914) reports that among 2,193 cases received into a hospital at Namur between September 11th and November 30th, 1914, there were 27 cases of tetanus. After October 15th every case had a prophylactic injection of 20 (Behring) units = 800 U.S.A. units, and among the