Original Communications.

ON THE DIFFERENT FORMS OF HÆMORRHAGE WITHIN THE EYE, PRODUCED BY INJURY.

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[Concluded from page 606.]

2. *Hæmorrhage between the Choroid and Sclerotic.* This form of traumatic hæmorrhage, when it occurs singly—that is to say, uncomplicated with hæmorrhage in any other part of the eye—is most commonly produced by an escape of the lens and a sudden loss of vitreous through a wound in an *unhealthy eye*; thus withdrawing unexpectedly the support which the choroid and retina had derived from these structures when, in their entirety, they occupied their normal position within the eye. It may, however, under certain conditions, be the chief form of hæmorrhage after an injury in a healthy eye.

In a *normal and healthy eye*, the lens and a large amount of vitreous humour may be lost through a wound of its external coats, without exerting any very unfavourable influence on the retina or the choroidal vessels. We witness occasionally this fact in the operation for the extraction of cataract, when, through some fault on the part of the patient in not properly restraining his emotions, or some accidental circumstance in connexion with the operation, an escape of vitreous follows the removal of the lens; yet, notwithstanding this, a good and permanently useful eye results.

In a perfectly healthy eye, the vitreous is thick and tenacious; its viscosity being, as Mr. Bowman has shown, most conspicuous in its outer or circumferential part, where, the hyaloid only intervening, it is in contact with the retina; whilst its inner portion, towards the centre of the globe, is of a thinner consistence. When a small quantity of vitreous in such an eye is lost, the anterior segment of the globe only is much affected by it; and the cornea and adjoining sclerotic, being rendered flaccid, fall inwards, but the posterior curve of the eye is but little altered in shape. If a greater quantity of vitreous be lost, the more fluid portion, or that towards the centre of the eye, will escape before the more viscid outer part is interfered with. A thick coating of healthy vitreous will, therefore, still be in contact with the retina, to maintain it *in situ*; so that, even if sufficient vitreous has escaped to cause a temporary folding in of the sclerotic posteriorly, yet no detachment of the retina from the choroid, or choroid from the sclerotic, will follow; for the choroidal vessels will still receive support adequate to prevent their undue distension, until the place of the lost vitreous is supplied with aqueous humour, and the shape of the eye restored.

The kind of injury to which the eye is subjected will, however, often determine the chief seat of the hæmorrhage, irrespective of the soundness or unsoundness of the eye at the time of the accident. One of the severe classes of injuries to which men who work at iron shipbuilding are exposed will illustrate this fact. The eye is occasionally literally ripped open by a fragment or some large piece of metal. One extremity of it, if it be large, or the whole of it, if it be small, strikes the eye in its rapid flight, enters it, and cuts its way out again, drawing with it the iris, lens, and a portion of the choroid—

in fact, all the textures with which it comes in contact. In such cases, as all the tissues within the eye suffer a direct injury, the hæmorrhage is probably from all of them; or, as the choroid may be absolutely stripped from the sclerotic, the chief hæmorrhage may be between these structures. The following is an example of this severe form of injury. In this patient it was found, after the eye was removed, that the chief hæmorrhage was between the choroid and sclerotic.

Extensive Rupture of the Globe from a Blow with a Large Piece of Iron; Extrusion of the Lens, a Portion of the Vitreous, Two-thirds of the Iris, and a Portion of the Choroid. John M., aged 24, works at iron shipbuilding at Millwall. He was brought to the hospital on the morning of June 9th, 1865, having, about two hours previously, met with a severe injury to the right eye. At the time of the accident, he was engaged in bringing together two iron plates with a pin and cotter; and, having struck the cotter with a hammer, from some casualty it flew out with great rapidity, and in its flight came in contact with the right eye.

State on Admission. There was a rent in the sclerotic, about three-quarters of an inch in length, running along the lower border of the cornea. One extremity of the steel cotter appeared to have entered the eye, passing through the sclerotic near the lower margin of the cornea, on its nasal side; and to have cut its way out again, inflicting a wound along the lower margin of the cornea, about three-quarters of an inch in extent. In its exit, it had dragged with it the lens, two-thirds of the iris, and a portion of the choroid, all of which were entangled in, and protruding from, the wound. A large quantity of the vitreous must have escaped at the same time; for the eye was shrunken to at least one-third of its normal size, and its tension was diminished to—T 2.

As the eye was completely lost, with the consent of the man I at once removed it. On making a section of it, the following was the state of the eye. Nearly all the vitreous had escaped through the wound, but a little was still left clinging to the remains of the lens and ciliary processes. The whole vitreous space was filled with a coagulum of blood, which had pushed in front of it the choroid and retina. The chief hæmorrhage had thus taken place between the choroid and sclerotic; but there had been also some anterior bleeding from the iris and ciliary processes; but this was slight, compared to the posterior hæmorrhage.

The man was able to leave the hospital at the end of the week.

In an *unsound eye*, traumatic hæmorrhage between the choroid and sclerotic is very liable to occur. From chronic disease, and the repeated increased vascularity of the eye consequent on it, the choroidal vessels have lost more or less of their proper tone; and their walls, either weakened by recurrent distension, or from some deprivation of the nervous influence of the sympathetic filaments which preside over them, become easily, and, on the slightest irritation, unduly injected. In such eyes, the loss of the lens, or of a portion of the vitreous, by diminishing the pressure on the choroidal vessels counter to the force of the impulse of the blood within them, will induce a sudden distension and yielding of their coats, which frequently ends in rupture, and hæmorrhage ensues between the choroid and sclerotic.

An increased or glaucomatous tension of the globe is the most frequent predisposing cause of this form of hæmorrhage. A glaucomatous state, varying in intensity, is frequently associated with chronic disease of the eye. It is not a primary affection, but is secondary to some pre-existing disease, and is often

the precursor of a later and even more unfavourable condition—that of a softening, or *minus* tension of the globe. If such an eye, with its tension above the normal range, from whatever cause it may have been produced, receive a wound, and a loss of the lens or vitreous follow, hæmorrhage between the choroid and sclerotic is almost certain to ensue; the already distended choroidal vessels are incapable of much further distension, and, on the withdrawal of a portion of their anterior support, yield before the pressure of the blood within them, and give way.

It is this form of hæmorrhage which occasionally occurs after an operation for the removal of a cataractous lens from an unsound eye; indeed, it is almost certain to happen, if there be an increased or glaucomatous tension of the eye at the time of operating. In such cases, the hæmorrhage takes place from the posterior surface of the choroid, detaching, sometimes partially, but generally completely, the choroid from the sclerotic, and, forming a large blood-clot, pushes in front of it the choroid and retina, and extrudes more or less of the vitreous from the eye. The credit of first drawing attention to the fact, that the posterior hæmorrhage which sometimes occurs after the operation of extraction of cataract is between the choroid and sclerotic, is due to Mr. Hulke, who first described it in the report of a dissection he had made of an eye removed by Mr. Bowman on account of this accident; and it has since been confirmed by Bowman, Crichtett, White Cooper, and others. One peculiarity of this form of hæmorrhage is the excessive pain which accompanies it. The separation of the choroid from the sclerotic by the clot, causes a dragging on the ciliary nerves, and induces the most acute and apparently almost intolerable suffering, accompanied often by a feeling of nausea and faintness. The severity of the pain appears to continue whilst the detachment of the choroid from the sclerotic is going on; but the pressure of the blood-clot on the ciliary nerves causes a continuance of the suffering, though much less in degree, for some time afterwards. If it happens after the extraction of cataract, it may follow immediately the escape of the lens, or in some cases it may be delayed for some hours, or occasionally even for two or three days. In two cases under my own care, in which it followed the extraction of cataract in unsound eyes, the hæmorrhage ensued very shortly after the escape of the lens. In each it was accompanied with violent and sudden pain; the cry of the patient being the first indication that all was not right.

In the first case, the operation was concluded, and the eyelids closed, and I was about to leave the room, when the nurse called me back on account of the sudden and violent pain the patient experienced. On undoing the eye, I found the vitreous and a quantity of blood welling from the globe. The pain was very severe. Active inflammation followed, and the eye suppurated.

In the second case, the hæmorrhage followed the extraction of an opaque lens, which had been dislocated two years previously into the anterior chamber. It is related in the *Royal London Ophthalmic Hospital Reports*, vol. iv, page 379. I removed the opaque lens by an upper section; its escape from the eye was followed by some fluid vitreous; and, in a few minutes afterwards, the man, who had borne the operation without uttering a word, cried out in the excess of his pain, "that it was unendurable; it felt as if his eye was being torn from his head."

In the museum of the Royal London Ophthalmic Hospital, there is a preparation of a staphylomatous eye, No. A 29, which had been ruptured by a blow, and afterwards excised by Mr. Streatfeild, in which

very extensive hæmorrhage had taken place between the choroid and sclerotic. The blood-clot occupies the whole vitreous space, carrying in front of it the choroid and retina as far forwards as the iris. The case is specially interesting, as illustrating the influence which the condition of the eye at the time of the injury exercises over the seat of the hæmorrhage. The eye in this patient, previously to the blow which ruptured it, was a damaged one, and had suffered from repeated injuries, first from a wound with an arrow sixteen years ago, and since then from a succession of blows on it, inflicted at different times by his opponents whilst he was engaged with them in the active discharge of his duties as prize-fighter. The eye had become staphylomatous and deprived of sight; and, although it is not stated in his case, yet we may fairly conclude that the vitreous was fluid; and it is also very probable that the tension of the eye at the time of the injury was greater than normal. The last blow he received ruptured the eye. The vitreous and the lens also (if there were one) escaped through the wound; and the chief hæmorrhage which followed was between the choroid and sclerotic. The history of the case, taken from the hospital note-book, is as follows.

J. W., aged 30, was admitted into the hospital, under Mr. Streatfeild, on Feb. 22nd, 1858. Sixteen years ago, his left eye was wounded by an arrow, and its power of vision reduced to a mere perception of objects. During the last ten years, he had received repeated blows on this eye. Two years ago, he had a severe blow on the left temple, after which the globe began to enlarge. Ten days since, he received another blow, which ruptured the staphylomatous portion of the globe.

State on Admission. The right eye was normal. The left eye—No perception of light; tension + T 1; cornea transparent; anterior chamber almost full of blood. A bluish red substance beneath the conjunctiva, near the lower corneal edge, made the globe appear irregular and large. Mr. Streatfeild excised the eye; and, on opening the conjunctiva, coagulated blood escaped.

Examination of the Eye after Excision. The blood which was seen when the conjunctiva was divided in the operation for the removal of the eye, was due to a rupture in the staphylomatous portion of the sclerotic, and had accumulated beneath that membrane. The globe was then divided vertically. The sclerotic was found to be thinned throughout its entire extent. The rupture was in the staphylomatous portion; in the ciliary region at the lower and outer part of the eye. The whole cavity of the globe was filled with dark red coagulated blood. The choroid and retina were detached and pushed forwards to the posterior surface of the iris. The coagulated blood was easily detached from the outer surface of the choroid from which the bleeding appears to have originated. No lens or vitreous could be found.

3. *Hæmorrhage into the Vitreous.* This may take place in two ways. 1. From rupture of some of the vessels of the ciliary processes; 2. From choroidal hæmorrhage; the blood breaking through the delicate structure of the retina and becoming extravasated into the vitreous; or it may ensue from the rupture of a retinal vessel, but this is rare.

We have found that blood effused into the aqueous is rapidly absorbed; this is not the case with blood in the vitreous. It may remain for months, or even for years, without being absorbed, and in some cases with little or no change in it taking place; although it occasionally happens, that, if small in quantity, absorption of it after a few months will ensue. It is always, therefore, a very serious result of an injury to find that there has been hæmorrhage into the

vitreous. If the amount effused be small, although the absorption of it is, as a rule, very slow, yet after a few weeks or months it becomes altered in character; it loses its colouring matter, and the clot shrinks; and it is seen, with the aid of ophthalmoscopic light, as a small dark mass, or it may be as filamentous shreddy particles in the vitreous, and in this condition it may remain for years. When the quantity effused into the vitreous is large, loss of the eye is almost certain to follow; not necessarily an immediate loss, but the chronic secondary changes which are the result of it only end in the destruction of all visual power. To allow the blood to be extravasated into the vitreous, the hyaloid has to be ruptured; and wherever the blood forces its way, it breaks down the texture of the vitreous. If, therefore, a large extent of the vitreous space be occupied by blood, the whole vitreous as a consequence suffers. From impairment of its nutrition, it atrophies, loses its consistence, and becomes fluid. In these large effusions of blood into the vitreous, although the clot may remain for a few weeks or months unabsorbed, yet with the change which takes place in the vitreous, it is slowly disposed of. As the vitreous becomes fluid, the clot softens and gradually disappears; but it stains the whole of the fluid which occupies the vitreous space to a yellow or brownish-yellow tinge, which colour may last for years. The mischief, however, does not end here; for, as the vitreous becomes fluid and the clot is absorbed, it diminishes in bulk; and the retina, losing the support which it had received from the healthy vitreous, falls forward and becomes detached.

Wound in the Sclerotic close to the Margin of the Cornea, from a Fragment of Iron detached from a Rivet; Large Prolapse of the Iris; Hæmorrhage into the Anterior Chamber, and into the Vitreous, from Injury to the Ciliary Processes; Excision of the Eye three months after the Accident. William R., aged 53, a boiler-maker, came to the hospital on September 26th, 1864, suffering from an injury he had received the day previously. Whilst cutting a cold rivet, a sharp-edged fragment of it flew off and struck the left eye, inflicting a wound in the sclerotic nearly a quarter of an inch in length, close to the lower and outer margin of the cornea.

State on Admission. The anterior chamber was full of blood, so as to prevent any of the deeper parts being seen. Through the wound above indicated, there was an extensive prolapse of the iris, which was jagged and torn. It was also probable that vitreous had been lost. The protruded lacerated portion of iris was removed with a pair of scissors; a cotton-wool compress was applied to the eye, and two leeches to the temple, to be repeated if necessary; and a belladonna lotion was ordered to bathe the eye with three or four times a day.

September 30th. A large part of the blood in the anterior chamber had been absorbed; and it was now evident that nearly the whole of the lens had escaped through the wound, and that there had been extensive hæmorrhage into the vitreous. A small quantity of opaque lenticular matter still remained; but, behind this, a large clot of blood could be seen in the anterior part of the vitreous space, immediately behind the ciliary processes from which the hæmorrhage had probably ensued. The eye was much inflamed, with chemosis of the conjunctiva, and very painful. The leeches to the temple were repeated. From this date, all active inflammation gradually subsided; and in about six weeks he was able to leave the hospital. All sight was lost. The blood in the anterior chamber was completely absorbed; but the clot in the vitreous still remained, though diminished in size.

In January of 1865, he was re-admitted into the hospital, as the lost eye had become inflamed and was giving him pain. It was quite blind, very soft, and shrinking; being already smaller than the sound eye. The blood in the vitreous had quite disappeared, and the retina was detached. Under these circumstances, I advised him to have the eye removed; and he having consented, I excised it. On making a section of it, the following was the condition. The lower and outer third of the iris was gone. There was no lens; but an opaque film remained, which was united to the posterior surface of the iris. There was no vitreous; but the retina was entirely detached and coarcted, fastened posteriorly around the optic nerve, and anteriorly adherent to the back of the iris. The space between the retina and choroid was filled with a yellow serous fluid. The choroid was *in situ* throughout, and in contact with the sclerotic except at several points where small echymoses separated them.

In this patient, it is probable that, in addition to the extensive hæmorrhage into the vitreous from the ciliary processes, there was also some hæmorrhage between the choroid and retina; but the blood in the anterior part of the eye prevented the fundus from being seen. The falling forward and complete detachment of the retina, is however a result which is often met with after a portion of the vitreous has been lost through a wound of the eye, and the remainder of it has been broken down by an extravasation of blood within it.

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A CASE OF THORACIC ANEURISM SUCCESSFULLY TREATED BY REST.

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THE interest attaching to all cases of thoracic aneurism, and to any measures which afford a prospect of relief in that disease, induce me to lay the following case, although an isolated one, under the notice of the profession, in hope that the practice which has, in this instance, been attended with very satisfactory results, may have a wider trial than has hitherto been given to it.

From the opportunities I have had of treating cases of thoracic aneurism, I am led to believe that but little good can be done by the administration of any drug. I have in several cases of late years given a fair trial to various modes of treatment; and, although I have seen improvement sometimes follow admission into hospital, from the rest, comparative quiet, and other treatment to which the patients have been subjected, I have never seen such marked benefit follow as in the case below.

The treatment of internal aneurism by absolute rest has lately been strongly advocated by Mr. Tufnell of Dublin; and he has recorded some very interesting cases, in which he adopted the practice successfully. I have carried out in my case the line of practice he has recommended, which consists essentially in keeping the patient in the recumbent posture, and in administering a restricted diet. The results of the case are, I think, the more satisfactory, inasmuch as various other modes of treatment—moderate diet—iodide of potassium—ice to the tumour—acetate of lead—had been tried without any success, before the treatment by rest was commenced.

The well known effect produced on the circulation by the recumbent posture was well illustrated in my patient; the pulse having diminished by from ten to