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THE

# CLINICAL USE OF THE OPHTHALMOSCOPE,

## IN DISEASES OF THE EYE.

BY LAURENCE TURNBULL, M. D.,

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The ophthalmoscope, or speculum oculi, has for its object the discovery of diseased conditions of the posterior segment of the eyeball, including the crystalline lens, its capsule, the vitreous humor, the retina, choroid, and the entrance of the optic nerve. Its employment requires about as much ingenuity and the same amount of time and attention as is necessary to become expert with the stethoscope; and certainly no physician should be satisfied in deciding upon the existence of amaurosis in any case without a prior examination with the ophthalmoscope. With just as much certainty could we consider a patient to be laboring under phthisis because he has purulent expectoration and fever. It will be found that there are numerous cases of amaurosis, which formerly would have been pronounced hopeless, but which, upon a careful examination by this admirable instrument, are ascertained to be curable, and the reverse will equally hold good, thus preventing a long and tedious course of treatment only to the detriment of the patient's general health and our own discomfiture.

Now, an important question comes up for consideration, what is amaurosis? Is it a disease, or merely a symptom? It is generally understood to be a disease, but from the too frequent ignorance of many of our profession, cases have occurred where they were utterly unable to answer this question, or even to define the term when called upon in courts of justice or other important tribunals.

I claim for the ophthalmoscope that it enables us to decide promptly and certainly as to

the seat of the disease and its nature, thus entirely relieving our cases of that obscurity which too often overshadows them, and enabling us to proceed at once to a correct and rational mode of treatment.

As is usually the case with every innovation upon old ideas, there is found a certain amount of opposition to its employment, and, as would naturally be anticipated, it comes from the same class of men as those who so strenuously opposed the introduction of vaccination, anaesthesia, and other equally valuable adjuncts to our profession, and who are equally well represented outside of our profession by the opponents of gas, the electric telegraph, etc., etc. Being unwilling to learn its use by the sacrifice of some time and labor, they endeavor to produce its condemnation by a variety of objections, among which may be mentioned the charge that it has injured the eye by the bright light which has to be employed in the examination, or that danger may result from the use of the solution of atropia. These, I am confident, have no existence, as in the numerous examinations which I have made with it since May, 1853, it has rarely been my lot to hear a complaint from my patients even of pain, or to see any injurious consequences result from its use.

Cases are continually being reported as amaurosis, without a word from the physician to show how so important a diagnosis was obtained. Now, if we were to publish accounts of diseases of the chest in the same way, ignoring the use of percussion and auscultation, our

conclusions would very properly be regarded as worthless. From these considerations, and the fact that I have employed it for the last six years, alone and in consultation, both in hospital and private practice, I have decided to give the facts connected with a number of cases in which its use has proved of great value in enabling me to arrive at definite conclusions as to whether my patient should be subjected to a course of alterative treatment, or be left to the *vis medicatrix naturæ*. In many instances I firmly believe that I have thus preserved my reputation and the health of my patients, which might otherwise have been sacrificed. Diagnosis is the all important secret of the physician, without which, our therapeutics are but an agency of evil, destroying what we wish to cure, and from this consideration alone, every conscientious physician and surgeon should gladly avail himself of all the auxiliaries within his reach.

I have also some hope that this paper may contribute to the introduction into more general use in this country, of so valuable, and I may say, indispensable an instrument.

To Dr. Mackenzie, of Glasgow, Scotland, is due the credit of applying the first rudimentary ophthalmoscope to the investigation of deep-seated diseases of the eye. His method consisted in directing the light of a gas jet through the pupil with a lens, so as to discover in a case the effects of hyaloiditis, or inflammation of the hyaloid membrane.<sup>1</sup> But the credit of the invention of the ophthalmoscope is due to Helmholtz, professor of physiology at Konigsburg, Prussia, though the first suggestion of such an instrument is undoubtedly due to Mr. Cumming of England. There have been numerous modifications, and also some improvements in its construction in the eight years which have elapsed since its first introduction to the profession, and I shall, therefore, without attempting to give any account of these successive steps, content myself with a description of the most simple and convenient form, and the one which I have always

employed. It is that claimed by Graefe and Anagnostakis. It consists of a simple concave mirror of about two and a half inches in diameter, with a small aperture in the centre, through which the observer looks. The posterior surface is covered with sheet copper, which should be blackened. A bi-convex lens should be employed in front of the mirror, unless the examiner is myopic. The mirror is set in a case or frame of wood, and is furnished with a handle, by which it may be steadied. They are made in this city by Mr. Francis, and can be obtained of Queen or McAllister.

A few general directions as to its employment may not be amiss, and may aid the experimenter in his investigations. In a dark room we should use a light similar to that from an argand lamp or gas burner, with a glass shade over it, and so placed as to be on a level with the eye which we desire to examine, but at the same time, behind or rather to one side of it. The observer seats himself upon a stool elevated above the patient, then places the instrument close to his own eye, so that the mirror will reflect the light into the eye to be examined. After obtaining the proper focal distance, which is usually about six inches, the lens is then placed about two inches in front of the eye of the patient. By this means we obtain first, a view of the cornea, then the iris, crystalline lens, vitreous humor, choroid and retina, each of which can be investigated in turn.

In all examinations of those portions of the eyeball which are situated behind the iris, it will be necessary to produce a dilatation of the pupil. This may be accomplished by applying the night previous, a small quantity of the soft extract of belladonna around the brow, or, if but a short time is allowed, it may be produced in a few minutes, by placing within the eyelids a few drops of a solution of

R. Atropiæ sulphatis, gr. ij.—iij.  
Aq. destill., f ʒi.  
Acid. sulph. dilut., q. s. M.

ft. solut.

As I desire to establish the true principle

<sup>1</sup> Mackenzie on Diseases of the Eye, p. 564, American edition.

of its application, I will give the cases in regular order, progressing from the crystalline lens, posteriorly until we arrive at the entrance of the optic nerve.

*Incipient Cataract.*—Case 1. Hannah B, a healthy colored woman, aged 56, a cook; married; has ceased to menstruate; complains of a dimness of vision. An examination of the eye showed a healthy appearance, but from her actions it was supposed to be a case of cataract in the formative stage. To render the diagnosis certain, a solution of atropia was dropped into the eye, and she was requested to wait for ten or fifteen minutes with the eyes closed. Upon opening them, the pupil was found dilated, showing no disease of the iris. She was then placed in a darkened room, with her head a little in front of a gas burner, and was desired to look at the ear<sup>1</sup> of the examiner, who was placed on a stool elevated a few inches above her. If it had been a case of true disease of the posterior surface of the eye, no solution of atropia would have been required, as in such cases the pupil is usually dilated. To further test the case, the catoptric test was resorted to. The light of the gas was reduced, and a lighted candle was then passed with care, up and down, in front of the eye; each of the images was seen, but the inverted and posterior one was not distinct. The gas light was then increased, and the rays directed, by means of the mirror of the ophthalmoscope, full upon the eye, so as to produce a red glare, which was concentrated by means of the convex lens placed in front of the mirror, and the whole eye of the patient was presented clearly for inspection. There was found stilted opacity of the lens, more on the left than the right, confirming the diagnosis, and making it certain that nothing could be done but to keep the pupil dilated with a weak solution of atropia, until the cataract was fully formed, when an operation would relieve her.

<sup>1</sup> This was done in order to give her something on which to fix her gaze, and thus prevent the eyes from moving about, as will be observed when this precaution is not taken. This principle is observed by daguerreotypists, etc.

*Dimness of Vision.*—Case 2. John K., aged 40; a pedlar. Complains of dimness of vision with deafness. An examination having been made, the eyes looked as if there was a slight haziness of the crystalline lens. The pupil was then dilated, and by a careful ophthalmoscopic examination, this haziness was discovered to be in the cornea, with no opacity of the lens or its capsule. A quantity of impacted cerumen was removed from his ear, and he was directed to procure a pair of spectacles, of about 48 inches focal distance. He shortly returned, and reported himself much improved. By means of the spectacles he was enabled to distinguish objects which before were almost invisible to him.

I have found that even with experts in the use of the ophthalmoscope, there is occasionally a tendency to confound opacities of the cornea with that of the crystalline lens, and yet there is no opacity, however small, that may not be detected by its use. Dr. Mackenzie observes, that "if a patient with incipient amaurosis presents himself to a practitioner who mistakes the case, and supposes it to be one of incipient cataract, the advice which he will give will be to wait with patience till the disease is fully developed, and then to submit to an operation. Should the patient return, after some months, with a fully developed amaurosis, instead of a cataract, the practitioner would necessarily feel that by his ignorance and inattention he had lost the only season for treating an amaurotic affection with success. The opposite mistake would probably lead him to the employment of depletion, mercury, and counter-irritation, by which his patient's health might be seriously compromised, but which could have no effect in removing an incipient opacity of the lens."<sup>1</sup>

*The Vitreous Body.*—The vitreous humor is a transparent, jelly-like mass, which is evidently held together by a delicate membrane. It fills up the posterior and middle part of the interior of the eye-ball. It is concavo-convex in form; the convexity which is posterior is

<sup>1</sup> Mackenzie on Diseases of the Eye, American edition, p. 703.

in close apposition with the concave surface of the retina, and in its concavity, which is anterior, is placed the crystalline lens. Thus it is readily seen that diseases of this body may, by contiguity, affect either of the others.

I have not been able to detect the punctated opacities, yet in the following case I discovered a diffused veil over the retina, obscuring the optic nerve and the vessels of the retina, evidently caused by an effusion of lymph, which, under the action of an alterative course, was removed.

Case 3. Jan. 19th, 1859.—Mrs. Matilda B., aged 48; a widow; has ceased to menstruate. She has suffered for the last twelve months with dimness of vision, and pain over the orbits. Upon examination by the ophthalmoscope, there was observed behind, and to the side of the crystalline lens, and in the vitreous humor, an opaque membraniform deposit. Lest this might be the retina, a second and still more careful examination was made, but failing to discover any vessels in it, I concluded that it was in the vitreous humor. I therefore directed the following pill to be taken three times a day:

R. Hydrarg. chlorid. mit. gr. xx.  
Pulv. opii, gr. ij.  
Ext. cinchon. comp. ʒss.

M. ft. pill. No. xx.

On the 26th she was completely under the influence of the mercurial, which was continued until Feb. 9th, when, as no benefit was observed, it was omitted, and substituted by

R. Liq. ferri iodidi.

S. Five drops every three hours, with a pill of quiniæ sulph. gr. j every four hours.

Feb. 11th.—Vision improving; able to see the fence across the garden of the hospital.

23d.—Still improving. A third examination with the instrument failed to detect the presence of any lymph. She was also directed to use a pair of spectacles.

March 5th.—Returned, with the report that she was improving, the spectacles having aided her much in vision.

Mr. Wordsworth, of the Royal Ophthalmic Hospital, London, reports a case of blindness

following a blow, which was entirely due to an extravasation of a clot of blood into the vitreous humor, in the direct axis of vision. It was quite invisible to the unassisted examination, the eye of the patient looking natural, but with the ophthalmoscope was immediately detected.

Professor Edouard Jäger has published a paper,<sup>1</sup> in which he relates the following case of a foreign body in the vitreous humor, detected by the use of the ophthalmoscope. In such cases, the least amount of light possible should be employed, so as not to increase the inflammation of the eye.

“A workman, whilst engaged in engraving on steel, was struck by a chip, which passed through the cornea and iris, and lodged in the vitreous humor. Without suspecting the gravity of his wound, he consulted Professor Jäger at the end of ten days, for a slight affection of his sight. There was only a very slight trace of a wound in the cornea and iris. On examining the transparent media, there was seen a foreign body enveloped in plastic exudation, as a consequence of inflammatory action; the fragment of steel became encysted at the end of a week, and the vitreous humor recovered its transparency, but the sight gradually diminished. Five weeks after the accident, separation of the retina in the neighborhood of the cyst was discerned. This separation soon extended over a third of the inferior and external portion of the retina, whilst the encysted fragment had moved from its first position, and was gravitating towards the middle of the eye. This displacement was only attended with a slight pricking in the external parts of the eye. A plastic deposit was then formed, which raised the retina and hyaloid in the form of a cone, at the summit of which was the encysted body. At the end of three months this small fragment had reached the centre of the globe. At first horizontal, it had now become vertical, a position which it maintained. The eye retained its form, the lens its transpa-

<sup>1</sup> *Öster.-Zeitschr. f. pract. Heilk.*, 1857, No. 2, on Injuries of the Eye, p. 42, by Wm. White Cooper, London, 1859.

rency, and there remained some amount of oblique vision."

*Retina.*—A common form of blindness or defective vision, arises from intemperance, and the following case will show that it often depends on inflammation of the retina:

Case 4. John Gorman, aet. 35, a strong, robust man, a laborer. He applied at the Hospital, Oct. 20, 1858, complaining of dimness of vision of three months duration, but which, within the last week, had become so much worse, that he was unable to guide himself, being compelled to have his wife with him. He had been an intemperate man, and still indulged in a drink once or twice a day. His eyes were natural, the iris sluggish. A solution of atropia, three grains to the ounce of water, was dropped in the eyes, and it was then discovered that the iris was contracted on one side. Used the catoptric test, and found the three images perfect.

He was directed to give up his stimulus, and use a bitter infusion, and take two comp. cathartic pills at bed-time.

Oct. 21st.—His eyes were now examined with the ophthalmoscope, and the iris was ascertained to be partially changed by a former inflammation; the lens and vitreous humor were perfectly clear, but the retina was found to be congested over its whole surface, with a varicose condition of its vessels.

Oct. 24. Pills and bitters taken regularly. Vision more indistinct. Had him cupped on the nape of the neck.

27th. No improvement. Directed the following:

R. Mass. hydrarg. ℥j.  
Ext. gentian. ʒj.  
Strychniæ, gr. j. M.

ft. pil. No. xx. One three times a day.

30th. No better, and very nervous; directed pil. assafœt. c., one three times a day, and continue the last prescription.

Nov. 1. Still very nervous, omitted the assafœtida, and directed

R. Ext. nucis vomicæ, gr. ʒ.

One pill every four hours.

10th. To-day, he can see indistinctly the houses opposite; feels somewhat improved, mouth slightly sore.

14th. Not so well; headache, and dimness of vision; pulse full; directed him to lose ten ounces of blood, and take a saline draught, omitting pills till after its operation.

17th. Much improved, pain gone, able to distinguish objects.

20th. Can see objects a distance of about three squares distinctly. He was discharged cured, with directions to continue the saline cathartic. This patient would, without doubt, have become permanently blind, had it not for the treatment he received, as congestion of this delicate membrane is soon followed by effusion of particles of lymph, and then there is entire loss of vision at those points.

The following illustration of the value of the ophthalmoscope in detecting obscure injuries of the eye, is given by Mr. Wm. White Cooper,<sup>1</sup> who remarks that "without the aid of that instrument, Mr. Dixon and myself could only have hazarded an opinion as to the probable nature of the injury, whereas we were enabled to speak with confidence and precision.

"Two officers, returning from Epsom races, were amusing themselves by throwing various missiles at the passers by; one of these missiles, a hollow wooden pear, struck, with great force, the right eye of a farmer; the sight was immediately extinguished, and the eye much bruised.

"Ten days afterwards, Mr. Dixon was consulted, and on examination with the ophthalmoscope, discovered a rent in the retina, and a considerable coagulum of blood, which lay against that membrane.

"Legal proceedings were taken against the officers, but it was agreed that an amount of compensation should be settled by two arbitrators, founded on a medical report to be sent in by Mr. Dixon, and myself, together with Mr. Simms of Staines, who had special

<sup>1</sup> On injuries of the eye, by Wm. White Cooper, pp. 233-4.

charge of the case. We met, therefore, on the 6th of October, and made a careful examination of the injured eye. The pupil was slightly dilated, and motionless; nothing abnormal, visible beyond this; objects were seen by the patient indistinctly, and a black patch obscured the central portion; pica type were read with difficulty, each word requiring to be separately made out. The ophthalmoscope showed the seat of the rent in the retina, as an opaque, irregular line, nearly in the axis of vision, and there were many small spots around this, evidently the remains of the coagulum of blood, which had not been entirely absorbed.

"In our report, we were able to state with confidence, that though Mr. J. might retain a certain amount of sight in the injured organ, we were of the opinion that it would never be restored to its former perfection."

*Choroid.*—Mr. Hulke, of London, has described some of the most common morbid changes occurring in the choroid, in children

with imperfect sight and rolling globes, as follows. The changes are large white patches, across which, the retinal and larger choroidal vessels may be seen coursing. A case of this kind we observed in a child suffering with defective vision, and verminose disease; and although various means were tried, it was not removed by any treatment employed. In an eye affected with ciliary staphyloma and hydrophthalmia, these changes had taken place; in which Mr. Hulke had an opportunity of examining after death. "Just behind the ora serrata, there was a narrow zone of tolerably normal choroid; but behind this, the choroid and retina seemed to have disappeared, leaving the sclerotic apparently uncovered, and sprinkled here and there, with a few black woolly flocculi. The absence of these membranes was only apparent. A more careful examination, found the choroid and retina adherent to each other, and to the sclerotic. The retina was atrophied, and its vessels in a state of fatty degeneration."

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<sup>1</sup> Ophthalmic Hospital Reports, Jan. 1858.