The ophthalmoscope in medical practice / by James Hinshelwood, M.A., M.D., F.F.P.S.G., Surgeon to the Glasgow Eye Infirmary.

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THE OPHTHALMOSCOPE IN MEDICAL PRACTICE.

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The importance of a careful examination of the eye with the ophthalmoscope as a part of the routine examination in all cases of doubtful diagnosis is not yet sufficiently appreciated. In all such cases a careful examination of the patient's various organs, his heart, lungs, liver, etc., is made as a matter of routine even in the absence of any special symptoms pointing to affection of these particular organs, and precisely the same rule should guide us with regard to the ophthalmoscopic examination of the eye. The value of ophthalmoscopic signs as an aid to medical diagnosis is universally known, and hence an ophthalmoscopic examination is usually made when the patient complains of any visual defect. But that pathological changes may be present in the fundus of the eye, without there being any great interference with central visual acuity, and hence without the patient being conscious of any visual defect, is a clinical fact not sufficiently well known. Nor is this so much to be wondered at, when we consider that the student's ophthalmoscopic training is nearly always acquired at an Eye Hospital, where patients never present themselves unless there is some decided visual defect. The knowledge of ophthalmoscopic changes apart from any conscious visual defect on the part of the patient can only be acquired by the constant use of the ophthalmoscope in the wards of a general hospital or in the daily work of private practice. It is surprising what extensive changes may be present in the eye, without the

patient being conscious of any marked interference with the function of vision. Optic .neuritis, choroiditis, albuminuric retinitis, retinal haemorrhages, and other such changes may be present and yet the patient make no complaint about vision. No doubt if a careful examination of such cases is made some change in the visual acuity or visual fields will be discovered, but the change has been so slight that the patient is not conscious of it. This is particularly true of changes confined to the periphery of the fundus. If the macular region is unaffected, it is remarkable what extensive pathological changes may exist towards the periphery of the fundus, without any complaint on the part of the patient as to interference with the function of vision. Hence the physician, who makes it a regular practice to examine ophthalmoscopically every case of doubtful diagnosis, even when there is no complaint regarding vision, will frequently be rewarded by discovering at the fundus of the eye pathological changes, which may furnish him with the necessary additional data for a diagnosis and which may even form the only unequivocal sign of disease.

With a little practice the ophthalmoscopic examination can be made at the bedside with as great ease as the stethoscopic examination. The great value of the direct method in making such examinations cannot be too strongly insisted upon. From the increased magnification, details and slight changes in the condition of the fundus are easily recognizable, which would probably escape observation if the examination had been made by the indirect method alone. To the beginner the direct method of examination presents much greater difficulties than the indirect; a little steady perseverance, however, will soon smooth away the difficulties, and with increasing experience he will rely more and more upon it alone.

Another point to be impressed upon the inexperienced is that a dark room is not necessary for making successful ophthalmoscopic examinations. Certainly such examinations can be made with greatest comfort in the dark room, but they can be made also at the bedside. If the patient is able to sit up in bed this is done very easily, and with a little practice a successful ophthalmoscopic examination can be made even with the patient's head resting on the pillow. In the case of un-

conscious and delirious patients, it is of great importance to be able to examine the patient in this position. In short, with practice there are few cases indeed where an ophthalmoscopic examination is not practicable even under the most unfavourable circumstances.

With regard to illumination, the room may be darkened by pulling down the blinds, and if this is not sufficient, I have often found it of the greatest service to exclude the light by an assistant holding an open umbrella over the head of the examiner. If there is no draught to make the light unsteady, a candle or taper will be found quite sufficient to get a clear view of the fundus with the direct method.

With regard to mydriatics, the greater the experience of the examiner, the less will he require to use them. Still there are many cases where their use is absolutely necessary. A drop of 2 per cent. solution of cocaine will dilate the pupil slightly with the great advantage of leaving the ciliary muscle and accommodation unaffected, or if still greater dilatation is desired a drop or two of homatropine solution (four grs. to one ounce) will affect the object, and the resulting paralysis of accommodation will remain only from twelve to twenty-four hours. Atropine should never be used for mere purposes of examination as the resulting paralysis of accommodation may persist from seven to ten days afterwards.

Having made the ophthalmoscopic examination of the eye a regular part of every routine examination, both in hospital and private work, during the whole of my professional life, the value of such a practice has been increasingly manifest to me. It therefore occurred to me that a few observations based on experience over a wide field of hospital and private practice might prove of some use and interest to others.

There is no intention here of traversing the whole field of medical ophthalmoscopy, which is too extensive a subject to be dealt with in the limits of a single paper. I have selected the groups of cases in which ophthalmoscopic signs are most frequently met with, viz. intracranial growths, cerebral meningitis, locomotor ataxia, and other forms of disease of the spinal cord, Bright's disease of the kidneys, and pernicious anaemia. Through the kindness of Professor M'Call Anderson

TABLE OF CASES EXAMINED IN PROF. M'CALL ANDERSON'S WARDS, 1892 TO 1897.

Disease.	Total number examined.	Number in which ophthalmoscopic changes were present.	Nature of Change.
Intracranial growths, -	18	10	9 cases : double optic neuritis. 1 case : optic atrophy, post-papillitic.
Cerebral meningitis, -	6	3	2 cases : double optic neuritis. 1 case : hyperaemia of discs with distension of veins.
Disseminated sclerosis,	12	2	2 cases : optic atrophy.
Locomotor ataxia, -	14	5	4 cases : optic atrophy. 1 case : hyperaemia of the discs.
Other forms of disease of the spinal cord,	22	2	Spinal meningitis : 1 case of optic neuritis. Syphilitic myelitis : 1 case of optic neuritis.
Bright's disease, chronic,	33	5	4 cases : neuro-retinitis with white spots and haemorrhage. 1 case : neuro-retinitis alone.
Bright's disease, acute,	32	2	2 cases : neuro-retinitis without white spots ; in one, numerous haemorrhages and subsequent death ; in the other, recovery.
Pernicious anaemia, -	4	4	2 cases : multiple retinal haemorrhage alone. 2 cases : multiple retinal haemorrhages with white spots
	141	33	

I am able to utilize the reports in his ward journals of the ophthalmoscopic examinations made by me in the wards during the last five years. The preceding table shows the number of cases examined in these different groups and also the number

of cases in which ophthalmoscopic changes were found. It will there be seen that out of a total of a hundred and forty-one cases examined ophthalmoscopic changes were found to be present in thirty-three. This must not be regarded as any indication of the usual proportion of fundus changes met with in the routine of medical practice. These groups have been selected as of special interest from the very great frequency of ophthalmoscopic signs. In many of the more common forms of disease ophthalmoscopic changes are rare. For example, in the hundreds of cardiac cases which I have examined, apart from pulsation of the retinal arteries frequently seen in valvular disease, I have only twice met with ophthalmoscopic signs directly connected with cardiac disease, viz. two cases of embolism of the retinal artery.

Let us take these groups and briefly review the results of clinical experience regarding the ophthalmoscopic signs in each.

Of the twenty-four cerebral cases examined, eighteen were cases of tumour, and in ten of these ophthalmoscopic changes were present. In nine cases the ophthalmoscopic sign was double optic neuritis of a very intense character. The neuritis was generally characterized by great swelling of the disc, complete obscuration of the edges, narrowing of the arteries, with distension and tortuosity of the veins. The vessels were here and there concealed by the swollen nerve tissue, or by exudation. Haemorrhages were frequent, and more commonly situated on the edge rather than on the surface of the swollen disc. Double optic neuritis, generally of this intense character, is a very valuable sign of intracranial tumour, because of the great frequency with which it occurs at some period in the progress of such cases. Our statistics illustrate to some extent the frequency of the conjunction of double optic neuritis with intracranial tumour, it being or having been present in ten out of the eighteen cases examined. Most statistics give a much more frequent occurrence of optic neuritis. Gowers says that in his own experience neuritis occurs in about four-fifths of the cases of cerebral tumour. The neuritis may occur at any period, and often does not occur until late in the history of such cases. All these

eighteen cases could not be kept under continuous observation, as many of them left the hospital, and it is highly probable that, could each case have been watched to its termination, a still larger proportion of cases with optic neuritis would have been recorded.

The optic neuritis is met with in tumours of all kinds, and in all positions within the cranium. In one of these cases the tumour was in the frontal lobe, in two others in the cerebellum, and in a fourth at the base of the brain. There is no special period at which the optic neuritis appears during the growth of the tumour, but as a rule it is not an early symptom.

There are exceptions to this, however, and it should be borne in mind that sometimes optic neuritis may be amongst the very earliest symptoms of intracranial tumour. The most striking example of this in my experience was a case seen about two years ago at the dispensary of the Western Infirmary. The patient was a man, apparently in robust health, who had been greatly troubled with giddiness, which had become so bad that he had to give up work and seek advice at the infirmary. The giddiness, or rather unsteadiness, was of a peculiar type with a great tendency to fall backwards. On cross-questioning him, he mentioned that his eyesight had been somewhat affected since the giddiness began. On ophthalmoscopic examination he was found to have optic neuritis of the intense type, with greatly swollen disc, haemorrhages, and exudations, the form commonly associated with cerebral tumour. There were no other symptoms, subjective or objective, to be made out on the most careful examination. The occurrence of the optic neuritis made it at once apparent that the giddiness was probably due to intracranial organic disease, and from the character of the neuritis, most probably to a tumour. The patient died in the Western Infirmary about six months afterwards, and at the autopsy a cerebellar tumour was found. Such an early appearance of optic neuritis is in my experience exceptional, still it is important to know that it does occasionally occur. Professor Max Knies reports a similar case, where double optic neuritis was one of the very earliest symptoms in a patient who, after death, was found to have a tumour of the cerebellum.

In one of eighteen cases of cerebral tumour examined, double

optic atrophy was found to be present. From the appearances it was evident that the atrophy followed a previous neuritis. It was therefore not a primary but a secondary or consecutive atrophy. This is an important clinical fact, which is apt to be overlooked by the inexperienced, that optic neuritis is a transient condition, and that when the patient comes under the notice of the physician the neuritis may be in the stage of retrogression, or may have actually passed into atrophy, the so-called post-papillitic or consecutive atrophy. This form of atrophy generally presents certain characteristic appearances which distinguish it from primary atrophy. The disc, though pale, has a filled-up appearance; the arteries are often smaller than normal in calibre, with white lines accompanying them, and the edges of the disc are frequently somewhat irregular, with disturbance of the pigment in their neighbourhood. In one of the nine cases of optic neuritis observed in the wards, the disc passed through all the stages from an acute optic neuritis of the intense type to a post-papillitic atrophy, during the patient's residence in hospital.

Of the six cases of cerebral meningitis examined, ophthalmoscopic changes were found in three. In two of these there was double optic neuritis, but of a very mild type, without much swelling of the papilla, and without the presence of haemorrhages or exudation. This mild form of neuritis is a marked contrast to the intense form with greatly swollen disc, haemorrhages, and exudations commonly met with in cases of cerebral tumour. In the third case there was hyperaemia of the disc, with distension and tortuosity of the veins. The importance of hyperaemia of the disc and distension of the veins as an aid to the early diagnosis of meningitis is, according to my experience, very considerable, and is certainly not generally known. The colour of the optic discs in conditions of health is very variable, and there is no strictly normal standard. In one patient the discs may be very pale, and in another distinctly pinkish, and yet this may be the normal character of each. When the hyperaemia is slight its pathological character can be recognized only by the fact of its having developed under observation. In all cases of suspected meningitis the discs ought to be watched carefully from day to

day as a part of the routine observation of the patient. If the discs are observed to become more hyperaemic, as evidenced by the increased redness or by the fact that a large number of previously invisible little vessels become visible upon the disc, then this is a sign of great significance, and particularly if this hyperaemia of the disc is accompanied by distension of the retinal veins. Hyperaemia of the discs and neuritis are much more frequent accompaniments of meningitis at the base than at the vertex, and hence these symptoms are met with most frequently in tubercular meningitis. The hyperaemia may be the first stage of a neuritis, but sometimes no neuritis develops. In these latter cases it is probably due to pressure of the basal effusion on the cavernous sinuses thus retarding the return of the blood from the discs, and leading to the hyperaemia and venous distension.

In nine cases of meningitis in private practice the discs have been watched carefully by me. In five of these cases at an early period hyperaemia with venous distension was observed, which in three developed into optic neuritis. Every physician of experience is well aware of the difficulties of early diagnosis in many cases of tubercular meningitis. I would insist in all suspected cases on a daily ophthalmoscopic examination of the fundus. The appearance of decided hyperaemia with venous distension will frequently be a valuable aid in enabling the physician to arrive at an early diagnosis. This hyperaemia may pass gradually into a neuritis, or may not. Taking hospital and private cases together, out of fifteen cases examined, optic neuritis was present in five, and hyperaemia of the discs with distension of the veins in three. Although in many cases of meningitis the neuritis does not manifest itself until the disease is well advanced and the diagnosis has already been established, still there are frequently cases where it is the earliest unequivocal sign of intracranial disease, and hence is of prime importance in the early settlement of the diagnosis. Hyperaemia of the discs with distension of the veins is often an early sign, and I think sufficient value has not been attached to this as a sign of intracranial disease. It is met with not only in tumour and meningitis, but in various pathological conditions, giving rise to increase of intracranial

pressure. As an example of its occurrence in other conditions, I will briefly quote two private cases—one of cerebral abscess, and the other of hydrocephalus.

In a case of cerebral abscess seen recently, the hyperaemia of the disc and venous distension gave great assistance in the early diagnosis.

A child, aet. eleven years, had been suffering from chronic suppurating ears for some time. Then headache with rise of temperature supervened. The optic discs were being duly watched, when the disc on the left side was observed to become markedly hyperaemic with great venous distension. A cautious prognosis was therefore given, although the other symptoms were improving. Three days after this, marked hyperaemia of the left disc was observed, the child had a series of severe convulsions either confined to the right arm and the right side of face, or, when general, always beginning with the right arm and right side of the face. The day after the convulsions both discs were hyperaemic with venous distension. The child was ultimately operated upon successfully by Prof. Macewen, and an abscess was found in the left temporo-sphenoidal lobe. An interesting point was the appearance of the hyperaemia of the left disc several days before that of the right, pointing to increase of pressure on the left side of the brain, of which we had unmistakable proof a few days later in the appearance of the convulsions confined to or beginning on the right side.

A case seen recently in consultation affords a further example of the value of hyperaemia of the discs with venous distension as a sign of increase of intracranial pressure.

The patient, a young lady, aet. eighteen years, when seen was comatose. There was a history of intermittent headaches for about a year previously, and of recent jaundice, from which she was recovering, when she was seized with gradually increasing drowsiness, which had rapidly deepened into coma. On ophthalmoscopic examination, the optic discs were found to be intensely hyperaemic, and the veins were greatly distended and tortuous. The hyperaemia and venous distension were equally intense in both eyes. The opinion given, based on the ophthalmoscopic examination, was that the coma was due to

increase of intracranial pressure, and from its rapid development probably pressure of a fluid nature. The patient died a few days afterwards, and on post-mortem examination there was found evidence of chronic hydrocephalus with excess of fluid in the ventricles and flattening of the convolutions.

In twelve cases of disseminated sclerosis examined, atrophy of the optic nerve was found to be present in two. Next to tabes, this is the nervous disease which is most frequently associated with primary optic atrophy. It used to be generally taught that optic atrophy occurred only very rarely in disseminated sclerosis. Buzzard several years ago called attention to the fact that clinical experience, on the contrary, showed that optic atrophy was found to occur in disseminated sclerosis with considerable frequency. My own experience is in harmony with that of Buzzard, and that out of twelve consecutive cases examined in the Western Infirmary, two should exhibit optic atrophy, is only a confirmation of my experience elsewhere. Specially important is the fact that the optic atrophy is frequently a very early symptom, and may first direct attention to the grave disease from which the patient is suffering, but of which the other symptoms are so slight that their true character has been unsuspected. I have seen at the Eye Infirmary a considerable number of cases where the optic atrophy associated with increasing weakness of the lower limbs and greatly exaggerated knee jerks, led to the diagnosis of atrophy dependant upon degenerative disease of the spinal cord, probably incipient disseminated sclerosis. In some of these cases kept under observation, the further development of other symptoms confirmed the diagnosis.

Out of thirty-six cases of disease of the spinal cord, ophthalmoscopic changes at the fundus were found in seven.

Fourteen cases of locomotor ataxia were examined, and atrophy of the optic nerves was found to be present in four. Of all the diseases of the cord, locomotor ataxia is that most frequently associated with ophthalmoscopic changes, viz. optic atrophy. It is very difficult to say with what degree of frequency these changes occur, and statistics vary greatly. Gowers, in his *Medical Ophthalmoscopy*, says that out of thirty consecutive cases observed by him, only three presented optic nerve

atrophy, and from these cases and other experience, he does not think that optic nerve atrophy occurs in more than 15 per cent. of ataxics. Leber estimates its frequency at 26 per cent., Berger at 33 per cent., and Uhthoff at 20 per cent. My fourteen cases form too narrow a basis to found reliable statistics on, however, they give nearly 28 per cent. The statistics of the ophthalmologists furnish a much higher percentage than those of the neurologists. While opinions differ as to its exact frequency, all are agreed that it is a very frequent symptom in locomotor ataxia, and, what is more important from the diagnostic point of view, that it very frequently is a very early symptom, and may sometimes even be the very first symptom. It is by far the commonest cause of optic atrophy. According to Galezowski, about two-thirds of all optic nerve atrophies are tabetic. I have always made it a routine practice at the Eye Infirmary, and in private, to carefully test the reflexes of every patient with optic atrophy, and have been struck with the great frequency with which the knee jerks are diminished or entirely absent. In many of these no other signs of tabes were present, but clinical experience teaches that in these cases with early atrophy the progress of the spinal disease is very slow. This occurs with such frequency that it may be said that every case of primary optic atrophy should raise a strong suspicion of tabes, and that the patient's reflexes should be very carefully examined. If this is done habitually, it will frequently lead to the discovery of incipient locomotor ataxia, which had previously been unsuspected.

In one of the fourteen cases of locomotor ataxia examined there was well marked hyperaemia in both optic discs with slight obscuration of the edges. According to Allbutt, in tabes the optic atrophy is preceded by hyperaemia of the discs with slight obscuration of the edges, but these symptoms never go on to optic neuritis. This patient was not under observation for a sufficient time for the subsequent development of the atrophy to be seen, but it is highly probable that the hyperaemia of the discs was the initial stage of atrophy, as described by Allbutt.

In other diseases of the spinal cord or its membranes, ophthalmoscopic signs are not very frequent. Out of

twenty-two cases examined, changes at the fundus were found in two. Double optic neuritis of a mild type was found in a case of spinal meningitis, and also in a case of syphilitic myelitis. Optic neuritis, however, is so rarely associated with these conditions as to be of very little value from the diagnostic point of view.

Out of sixty-five cases of Bright's disease examined, ophthalmoscopic changes were found in seven. Here too there is a great discrepancy in the statistics as to the frequency of retinal changes given by different writers. This varies from seven to thirty per cent. According to Professor Knies the lower figure is probably nearer the truth. Our statistics give retinal changes present in about eleven per cent. of the cases, and this is probably a fair approximate to the actual frequency.

The fundus change generally met with in the chronic and subacute cases of Bright's disease is a double neuro-retinitis. The characteristic neuro-retinitis albuminurica is distinguished by two features, viz. white patches and haemorrhages, which may either be combined or occur separately. More frequently they are both present. The white patches of various shapes and sizes scattered irregularly over the fundus are very frequently grouped in a stellate form round the macula.

Out of thirty-three cases of chronic Bright's disease, neuro-retinitis was found to be present in five. It was of the typical albuminuric type, with white spots and haemorrhages in four cases, but there was one case in which neither spots nor haemorrhages were present but simply a mild neuro-retinitis. Hence in all cases of neuro-retinitis the urine should be examined for albumen even in the absence of white spots and haemorrhages. From the diagnostic point of view the detection of neuro-retinitis albuminurica is frequently of the greatest importance, as it is so often a very early symptom, and leads directly to the discovery of therenal disease, which may have hitherto been quite unsuspected by the patient. Chronic Bright's disease is generally very slow and insidious in its onset. It may have been present for a considerable time, and yet have given rise only to vague general symptoms such as headache, malaise, digestive disturbances, or a feeling of weakness. The occurrence of neuro-retinitis and consequent failure

of vision causes the patient to seek advice. The ophthalmoscopic appearances lead to the examination of the urine, when the true character of the disease is discovered. This is a familiar experience. In a large proportion of the cases of albuminuric retinitis presenting themselves at the Eye Infirmary, the renal disease has been quite unsuspected, and the diagnosis is first made from the fundus appearances.

From the point of view of prognosis, the recognition of albuminuric retinitis is of some importance. But here a distinction must be made between chronic and acute Bright's disease. Retinitis and neuro-retinitis, although occurring most frequently in the chronic forms of renal disease and particularly in interstitial nephritis, are met with in the acute and subacute forms of nephritis. These conditions occurring in chronic Bright's disease are always symptoms of grave prognostic significance. It is a matter of general agreement that in such cases life is rarely prolonged longer than one year, at the most two years after the discovery of the retinal affection. Fundus changes are also met with in the acute form. Out of thirty-two cases of acute Bright's disease examined, fundus changes were found in two. This is a much smaller percentage than in the chronic forms. In these two cases there was a double neuro-retinitis, but without the characteristic white spots. In one case there were very numerous haemorrhages scattered all over the fundus. This case was noticeable in that the haemorrhagic neuro-retinitis developed during the stay of the patient in hospital. The fundus was examined shortly after admission and found to be normal. The patient died of oedema of lungs and larynx nine days after the discovery of the haemorrhagic neuro-retinitis.

This case supports the view expressed by some as to the particularly grave prognosis associated with the haemorrhagic form of neuro-retinitis.

In the other case of acute nephritis, the neuro-retinitis of a very mild type gradually subsided with the progressive disappearance of albumen from the urine. Recovery in the acute and subacute forms is by no means rare, the retinitis gradually subsiding with the disappearance of the albumen. This favourable termination is seen most frequently in the retinitis

met with in the albuminuria of pregnancy, where the albuminuria is generally transitory, disappearing after the birth of the child. I have reported in the *British Medical Journal* of 8th May, 1897, a complete recovery from albuminuric retinitis of typical form with white spots and haemorrhages, in a case of acute parenchymatous nephritis, the retinitis gradually disappearing with the albumen, until both fundus and urine were normal.

Clinical experience thus teaches that in albuminuric retinitis the prognosis must largely depend upon the character of the renal affection. If it occurs in the course of a chronic interstitial nephritis the prognosis is exceedingly grave, and the probability of the patient surviving beyond a couple of years is very slight; but if it occurs in the course of an acute or subacute parenchymatous nephritis, with careful treatment and under favourable hygienic conditions, there is considerable hope that the patient may recover from the renal condition and that the retinitis may disappear, leaving the patient sometimes with vision but little impaired. Hence in every case of albuminuric retinitis, before expressing an opinion as to prognosis, it is of great importance to ascertain by careful consideration of the history and examination of the urine the character of the renal affection.

In progressive pernicious anaemia the ophthalmoscopic signs are most important from the point of view of diagnosis. I have examined in the Western Infirmary four cases of pernicious anaemia, and in every case multiple retinal haemorrhages were found. Two were males and two females, and all had a fatal termination. This experience confirms that of other observers. One of the characteristic features of pernicious anaemia is a tendency to haemorrhage, but it is not sufficiently well known that haemorrhages occur more frequently in the retina than elsewhere, and hence form a most valuable aid to diagnosis. Of sixteen cases examined by Quincke, retinal haemorrhages were absent in one only. In thirty cases examined by Horner, extravasations were present almost without exception. Retinal haemorrhage is therefore one of the most constant symptoms of this disease. The haemorrhages are nearly always multiple and in both eyes. In the four cases examined this was so. These retinal haemor-

rhages, generally pretty numerous, are of varied sizes and shapes. They are usually most abundant round the optic nerve entrance, and are more or less flame-shaped, from their situation in the layer of nerve fibres. They are frequently, but not always, associated with white spots and areas, which according to many are due in part to leucocyte-like cells, and in part to degeneration of the retinal tissues. In two of the four cases these white spots were seen, but in the other two haemorrhages alone were present. As a rule there is no conscious defect of vision unless extravasation takes place into the macular region. In one case the patient complained of misty red vision in one eye, and on examination a large recent haemorrhage was seen near the macular region, but in none of the others was there any complaint about vision. The eyes were examined as part of the routine examination. In the very large number of cases of anaemia and chlorosis examined by me, I have never seen multiple retinal haemorrhages such as are almost constantly met with in progressive pernicious anaemia. I have seen slight optic neuritis and single large haemorrhages in these conditions, but this could not be confused with the multiple retinal haemorrhages of pernicious anaemia. It should be remembered, however, that in leukaemia sometimes a leukaemic retinitis is met with, in which retinal haemorrhages and white spots form a prominent feature. But the other symptoms easily differentiate it from pernicious anaemia.

In the diseases mentioned in the preceding pages, ophthalmoscopic signs are of very frequent occurrence, and hence in these conditions are often of great importance as an aid to diagnosis. In many other diseases, however, ophthalmoscopic changes, though comparatively rare, may sometimes give considerable help in diagnosis, and may actually lead to the diagnosis of a disease previously unsuspected.

In valvular diseases of the heart ophthalmoscopic changes are very rare, with the exception of pulsation of the retinal arteries frequently visible in cases of valvular disease, and particularly frequent in aortic regurgitation. On two occasions, however, in my experience, the recognition of embolism of the retinal artery led directly to the diagnosis of valvular disease of the heart.

The first case was that of a woman, aet. forty-five, suffering from bronchitis, who, while in the waiting-room of the Western Infirmary, after a fit of coughing, suddenly lost the sight of the right eye. She was seen on the following day in the wards, and on ophthalmoscopic examination it was evident that the loss of vision was due to embolism of one of the main lateral branches of the central artery of the retina. The embolus could be seen as a dark-red swelling plugging the main lateral branch supplying the macular region, and beyond it the vessel was reduced to a mere thread. The retina showed a diffuse greyish opacity round the macular region, with the macula clearly showing as a bright cherry-red spot. These appearances were especially characteristic. On examining her heart, a systolic murmur was heard at the apex, but the patient herself was not aware that she had heart disease. On examining this patient a year afterwards, it was found that with the right eye she could only see large objects somewhat indistinctly in the peripheral parts of the field. On ophthalmoscopic examination the disc presented all the appearances of optic atrophy. It was silvery white, with clean cut edges, and the branches of the retinal artery supplying the macular region were reduced to mere threads.

The other case was that of a man, aet. fifty-eight, who presented himself at the Eye Infirmary with the history that on the preceding day he had suddenly lost the sight of his right eye. There was no complaint whatever about his general health. On ophthalmoscopic examination it was evident that the sudden failure of vision was due to embolism of the central artery of the retina, as evidenced by the pallor of the disc, the retinal arteries reduced to mere threads, and the bright cherry-red spot in the macular region, surrounded by the opaque greyish oedematous retina. On examining his heart there was a loud systolic murmur, best heard at the apex, which was displaced downwards and to the left.

In these two cases the ophthalmoscopic examination led directly to the discovery of cardiac disease. Embolism of the retinal artery is not a common affection, and unless it is seen within a few days of its occurrence, the typical appearances will have disappeared, and the nature of the case can only be

inferred from the history. These two cases were examined within thirty-six hours of their occurrence. As a rule it takes several hours for the characteristic appearances caused by the opaque oedematous retina to develop, and in the course of a week or two these will have entirely disappeared. It is therefore possible to make the diagnosis with certainty only during a comparatively brief period. In the first case the fundus examined a year afterwards presented all the appearances of optic atrophy, and the true nature of the case could only have been inferred from the history of the sudden onset of the blindness, and from the great reduction in the calibre of the retinal arteries.

Whilst albuminuric retinitis is a condition which is more or less familiar to every one, there is a peculiar form of retinitis met with in diabetes mellitus, which is by no means so well known. This diabetic retinitis is a very rare affection as compared with the albuminuric form. It is, however, of great importance to be able to recognize it, as its recognition may first lead to the examination of the urine, and the discovery of the grave disease from which the patient is suffering. In a case recently seen by me, the recognition of the retinitis led directly to the diagnosis of diabetes mellitus previously unsuspected.

A lady, aet. fifty-two, consulted me recently about gradual failure of vision in both eyes. On examination, a retinitis of a peculiar type was seen. Numerous brilliant white spots were scattered over the fundus, most abundantly between the macula and the optic nerve. They varied greatly in size, some being very large, obscuring the retinal vessels, and others mere rounded points. A few small haemorrhages were to be seen near the vessels. The appearances differed from those of albuminuric retinitis in two respects. (1) There was no radiate arrangement of white spots in the peri-macular region; and (2) there was no neuritis, the optic nerve being quite normal. The patient expressed herself as not feeling very well during the last year. On examining her urine its specific gravity was found to be 1034, with a very minute trace of albumen but abundant sugar.

On further examination of the patient she admitted that

she had been somewhat thirsty of late, and had been passing a considerable quantity of urine.

It is generally taught that retinitis occurs in severe cases of diabetes, and in the late stages of the disease, and my previous experience was entirely in harmony with this. When this is so the diagnosis of diabetes has long since been made. The case reported, however, shows that there are exceptions to this as to most rules, and that retinitis may occur at a very early period in the course of the disease, and may first lead to its detection. According to Hirschberg, retinitis with haemorrhages and white patches is generally found in diabetes which has lasted more than ten to twelve years, and is a terminal symptom of the disease.

The case just recorded was first seen by me fourteen months ago, and the patient is still in fairly good health, the amount of sugar being kept in control by dietary. The retinitis remains practically the same. Hence in diabetes mellitus, although the occurrence of retinitis generally increases the gravity of the prognosis and points to an early fatal termination, there are exceptional cases where the retinitis occurs in mild cases and at an early stage of the disease.

The ophthalmoscope often gives the physician most valuable information as to the presence of syphilis. The surface of the body is always carefully examined in a suspected case for scars, cicatrices, and other indications of previous syphilitic affections, but the fundus of the eye is but rarely explored with a view to throwing light on the past history of the patient. Yet the fundus of the eye often supplies unmistakable evidence as to past syphilis, either acquired or congenital. Choroiditis and retino-choroiditis are frequent results of both acquired and congenital syphilis. These leave considerable traces on the fundus for the rest of the patient's life in the shape of atrophic patches surrounded by irregular accumulations of pigment. Very frequently the macular region entirely escapes, the disease having been confined to the peripheral parts of the fundus, hence the patient's central vision is good, and there is no complaint as to diminished visual acuity. If there is any suspicion of syphilis, acquired or congenital, the eyes ought always to be examined with the ophthalmoscope, although the external appearances

are normal and the patient's vision is good. The physician will frequently be rewarded by discovering at the fundus changes in retina and choroid, which give him invaluable information as to the past history of the patient.

The preceding pages amply support the proposition that in medical practice an ophthalmoscopic examination should be made a part of the routine examination of the patient, even where there is no complaint whatever as regards vision. It has been repeatedly pointed out in this paper that very extensive changes at the fundus may be found with little if any lessening of the central visual acuity, and hence without any consciousness of visual disturbance on the part of the patient. Too little attention has been paid to this aspect of ophthalmology, and hence its great importance as an aid to medical diagnosis is not sufficiently appreciated. A little practice will enable the observer to acquire the direct method of examination, and he will thus be in a position to examine ophthalmoscopically the ocular fundus with as great ease as he can examine the heart with his stethoscope.

A new field of examination is thus opened to him, in which he may see additional objective signs of disease, which will often be of the greatest service to him, sometimes by confirming the diagnosis already arrived at, sometimes by supplying the additional data requisite for a diagnosis, and sometimes even by affording the first objective signs of the general disease from which the patient may be suffering.

One thing is certain, that the greater the attention bestowed on the relationship between eye symptoms and general diseases, the greater will appear the advantages of the routine use of the ophthalmoscope in medical practice.