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CERTAIN CHANGES IN THE VESSELS AND VASCULAR COATS OF THE EYE WHICH ARE OF DIAGNOSTIC AND PROGNOSTIC VALUE IN GENERAL DISEASE.

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ADDRESS BEFORE THE MEDICAL AND CHIRURGICAL FACULTY OF MARYLAND,
APRIL 26, 1900.

It is always difficult for one whose lines have fallen chiefly in the places of special medicine and surgery, when called upon to address an audience composed chiefly of general practitioners—for which privilege I desire to express my high appreciation and return my heartiest thanks—to bring forward a topic that does not, on the one hand, smack too much of his own particular work, and, on the other, portray facts of mutual interest that are too well known to escape the opprobrium of oft-told tales. The mimicry of general disease by eye-strain, the diagnostic value of medical ophthalmoscopy, the ocular signs of the various toxemias, and the surgery of the eye are subjects which naturally suggest themselves and which are fraught with interest in which general and special practitioners alike may share. But a just consideration of the merits of any one of these in all its bearings would require an expenditure of time not possible or advisable on an occasion like this. We may, however, consider a subdivision of one of these topics which I trust will provide subject-matter of common interest, to wit, certain phenomena visible in vessels and vascular coats of the eye, which are indices not only of what more intimate clinical study of these tissues might reveal, but of the general malady to which they owe their origin.

Some of the best marked of these phenomena require no instruments of precision for their detection; others demand the use of the ophthalmoscope, of which instrument all physicians should make intelligent use, as they do of other instruments which refine their methods of examination and diagnosis. To be sure, it bor-

ders on exaggeration to say, as has the late Dr. Edward G. Loring, that with the ophthalmoscope "it is like walking into Nature's laboratory and 'seeing the Infinite in action,' " but the importance of systematic ophthalmoscopy is not readily overstated. "All who have employed the ophthalmoscope in medical practice," says Dr. Gowers, "will agree with Hughlings-Jackson in urging the routine use of the instrument in all diseases in which ophthalmoscopic changes are, even occasionally, met with. It often happens that unexpected information is gained regarding the nature of the disease or its probable consequences." One caution, however, I would here introduce, viz., diligent examination of the eye for signs of disease in distant portions of the organism is indispensable; but of equal or greater importance is it to remember that the eye itself may be responsible for symptoms which often are erroneously attributed to the deranged function of totally different organs. Let me elaborate this point a little:

It is unquestionably true that fully 75 per cent. of ocular disorders depend upon anomalies of the refraction, accommodation, or muscular balance of the eyes. Correction of such faults is followed by the greatest good to the eye and to the general organism in which the strain has been interpreted by symptoms not necessarily suggestive of their origin. When one comes to think about them, these symptoms stretch out into an extraordinary train, but we have ceased to wonder, and as a matter of course investigate, or cause to be investigated, the eyes whenever searching for the etiology of headache of all kinds, migraine, vertigo, nausea, pseudo- and habit-chorea, neurasthenia, and other disease-phenomena of similar manifestation. We have learned that many so-called gastric troubles—tachycardia, flatulent and other types of dyspepsia, indigestions, night-terrors, especially as they occur in children—may have a like origin, and we have found out that pains strangely and persistently situated in the nape of the neck, between and under the shoulder-blades, at the end of the spine, and deep in the mastoid may owe their origin to the same cause. These facts are widely—I was about to say almost universally—known, although, curiously enough, many of the most important of them find no place in the most-used text-books on general medicine.

While knowing these things, and profiting by the knowledge, I wonder sometimes if we remember that the discovery of the eye-strain reflexes—a discovery which it is not too much to say, in so far as the relief of human suffering and the sum of human happiness are concerned, deserves to rank with the best scientific announcements of the century just completed—is chiefly an American find, which largely we owe to the genius of Weir Mitchell and to the labors of William Thomson and Ezra Dyer. Listen to the proclamation of more than a quarter of a century ago:

"What I desire, therefore," says Mitchell, "to make clear to the profession at large is:

"1. That there are many headaches which are due to disorders of the refractive or accommodative apparatus of the eyes.

"2. That in these instances the brain symptom is often the most prominent and sometimes the sole prominent symptom of the eye troubles, so that while there may be no pain or sense of fatigue in the eye, the strain with which it is used may be interpreted solely by occipital or frontal headache.

"3. That the long continuance of eye troubles may be the unsuspected source of insomnia, vertigo, nausea, and general failure of health.

"4. That in many cases the eye trouble becomes suddenly mischievous, owing to some failure of the general health, or to increased sensitiveness of brain from moral or mental causes."

We have elaborated our methods, improved our instruments of precision and extended the list of "interpretations" of eye-strain, but otherwise have been able to add but little to this complete and compact presentation of the facts of the case.

It took some time before "the profession at large" received this new gospel, and even now missionary work is often needed. Perhaps the desire to enlighten on this point has led ophthalmologists into statements that seemed unduly to magnify the importance of eye-strain—indeed, the whole matter has not always escaped exaggeration—and this, in turn, may have led at times to an apparent indifference on the part of the general practitioner to the effect of eye-strain. Time was when the "general-man" thought a little contemptuously that the "eye-man's" horizon was bounded by the rims of a pair of spectacles, while the "eye-man" wondered how long it would be before the "general-man" would discover that drugs play only one *rôle* in the amelioration of symptoms, and that not always the most important. And even now, whenever this contempt of each other's point of view is pronounced, it tends to a divergence of energies that is apt to result in bad therapeutics. Thus, spectacles are prescribed for uric-acid headache, and calomel, lithia, the coal-tar products and what-not for an astigmatic migraine. Always to attribute a headache and the other reflex symptoms just detailed to eye-strain manifestly is absurd, but to forget its importance as a frequent causative agent is equally absurd. Why not join forces and properly investigate and weigh all etiological factors until we arrive at an intelligent conception of each case and reach the highest type of therapeutic success? Thus each medical man becomes helpful to his neighbor, one class of practitioners to another, and all classes to the great guild to which we have the honor, the very great honor, to belong.

From this introduction, perhaps I should say digression, permit me to turn to the main topic for discussion, and direct your attention to the phenomena visible in vessels and vascular coats of the eye to which I have briefly referred in the beginning of the paper.

Ordinarily the blood-vessels of the conjunctiva and episclera—the anterior and posterior conjunctival and the anterior ciliary vessels—are not conspicuous in health. Still, their transparent cov-

ering renders their study easy, even under normal circumstances, and very easy when inflammation makes more prominent those which are always visible, and brings out many others which ordinarily are invisible. Now, overfilling of these vessels, or, in general terms congestion or hyperemia, is not necessarily a symptom of local ocular disorders only, but may have a more far-reaching significance. Perhaps the most interesting and important of these conjunctival congestions of far-reaching significance are those which are symptoms of masked gout. They were originally described by Jonathan Hutchinson (*Trans. Ophth. Soc. U. K.*, Vol. V, 1885, p. 6) under the name "hot eye" as follows:

"Usually one eye only is affected, but sometimes both. The conjunctiva becomes red, and the eyeball feels hot, and pricks, as if sand were in it. The attack may come on within half an hour of the meal which has disagreed, and it may last a few hours, or a day or two."

The sensation in the eye thus affected is somewhat analogous, I think, to the itching and burning which at night often attack the soles of the feet of gouty subjects; that is, the gout "lisps," as Strabo would say, not only in the plantar surface, but on the scleral expansion. A similar and perhaps identical condition has been described by Swan M. Burnett (*Archives of Ophthalmology*, XXI, 1892, p. 260), but was attributed by him to a disturbance in the vaso-motor system, the cause of which could not be positively determined. Evidently the more elaborately recorded fugacious periodic episcleritis of Fuchs (*Graefe's Archiv.*, XLI, iv, p. 229) is the same disorder, perhaps rather better developed.

These transitory episcleral congestions come on rather suddenly, and present themselves in the form of patches of hyperemia of the sclera and the overlying conjunctiva, sometimes with a distinct violaceous hue, which last for a few hours or a day or two, and recur again and again, and are associated with photophobia, burning and itching. Usually an affection of middle life, it is not necessarily so, and may occur in comparatively speaking young persons. Two of the best examples which I have seen were in women under thirty years of age, who in all other respects appeared to be in the bloom of perfect health. This was the sole manifestation of the gouty condition, and yielded to suitable remedies.

Hutchinson regarded the conjunctival condition as often antecedent to an inflammation of the iris, although not necessarily so. I have observed a relationship which seems to me more important than this, viz., that periodic episcleral congestion of gouty origin may be the forerunner, sometimes the follower, of retinitis and retinal hemorrhages. I will refer to this more in detail later on. But from the general standpoint it is a sign worth consideration, because it may be the only symptom of a masked gout, the prodrome of a gouty explosion elsewhere in the body, or the first indication of vascular changes deep in the ocular coats, which, in their turn, are significant of widespread arterial changes throughout the body.

But the blood-vessels of the conjunctiva do not only become congested, but they frequently rupture, the blood spilling out into the subconjunctival tissue, and appearing on the sclera as bright or dark red patches, according to the amount of blood effused. Those conjunctival hemorrhages which are part of the symptomatology of ocular diseases, or occur as the result of trauma, or from violent coughing, as in pertussis, are not now in consideration, but only those which occur spontaneously. That hyphema, retinal hemorrhages, or retinitis, may be the first symptom which directs attention to chronic nephritis is well known, but that recurring subconjunctival hemorrhages may play the same rôle is equally true, although it is doubtful if they have received the place which they deserve among the ocular signs of so-called Bright's disease. Occasionally writers, for example, Talko, D. B. St. John Roosa, F. Ring, C. S. Bull, have called attention to this matter, but more commonly text-books when describing nephritis are silent with reference to the symptom, although other hemorrhagic phenomena, epistaxis, purpura, retinal extravasations, etc., are recorded.

In my experience these subconjunctival ecchymoses have occurred in persons past forty, and usually during sleep, the patient being surprised on waking in the morning to find a more or less extensive subconjunctival extravasation, most frequently, I think, in the left eye. In one case they may occur at comparatively short intervals; in another the periods between the attacks may comprise several weeks or even months. In five cases seen recently, three of the patients having died, the ages were in two between forty and forty-five, in one between fifty and sixty, and in one between sixty and sixty-five. The fatal issue occurred within three years after the first subconjunctival hemorrhage was noted, and these hemorrhages were the first sign which called attention to the chronic contracted kidneys from which they all suffered. What the relative frequency of these subconjunctival hemorrhages is compared with other more commonly-described ocular manifestations of nephritic origin is not apparent, owing to insufficient data. Sometimes it would seem that they may be associated with the ordinary retinitis of nephritis, but this is not my own experience. Perhaps in a certain sense they may at times replace the retinal lesions of chronic nephritis; certainly they may precede them. If this association of Bright's disease and recurring subconjunctival hemorrhages is a matter of common observation, as indeed it well may be, at least the fact has not been emphasized, and the simple rule to examine the urine carefully in each such case may lead to the discovery of a serious renal disorder, which, as William Osler has said, is frequently latent, and even in an advanced grade may be compatible with great mental and bodily vigor.

Of course, hemorrhages of this character occurring in elderly people are indicative of ordinary angio-sclerosis, and are only one of the many signs of this condition, but what I wish to point out is that they are not confined to the eyes of old people, but may be

seen, as I have just quoted, in those not much over forty, and in subjects, moreover, in apparently perfectly vigorous health, and when signs of arterial degeneration are not evident in the radials or temporals. One patient to whom I have referred scouted the idea of the necessity of urine examination, although within three months he had had three spontaneous subconjunctival hemorrhages, none of them very large, and all of them disappearing quickly, a peculiarity which, if anything, enhances the significance which I have given them. They are the little leaks announcing that a greater break is not far off.

An exactly analogous condition may appear in the delicate skin of the lower eyelid, and should, therefore, be designated recurring subcutaneous ecchymoses. The spots are only a few millimeters in length, of a slightly purplish hue, resembling a small bruised area, and, like their congeners in the conjunctiva, they come and disappear quickly. They undoubtedly have exactly the same significance. Indeed, in one case I have seen the subconjunctival and subcutaneous ecchymoses alternate. It is unnecessary to dwell further upon this subject, except again to emphasize the importance of observing changes in the subconjunctival and episcleral vessels and their relationships to serious widespread general vascular disorders.

The vascular changes which occur in the iris in connection with general disease are a little more difficult to study; in fact, except in so far as certain types of inflammation of this membrane are associated with Bright's disease and diabetes, the iritis under these circumstances being accompanied by recurring hemorrhages in the anterior chamber, they are not of very great interest to the general practitioner as a source of diagnostic information.

Permit me now to pass to a consideration of the changes in the retinal arteries which are indicative of general arterial disease from the ophthalmoscopic standpoint, and which recently have been attracting renewed attention and have created widespread and deserved interest.

Inasmuch as arterio-sclerosis, both as an independent affection and as an associated condition, has been, especially since the classic researches of Gull and Sutton, the subject of accurate clinical study, it would seem natural that the retinal arteries, readily examined as they are in a natural state, should have received a full share of consideration. In point of fact, however, text-books, both general and special, are singularly silent in regard to them, and sometimes express themselves in such a manner that one is led to believe that from the appearances of the retinal vessels no inference as to the condition of the general vascular system can be made. For example, Gowers (*"Medical Ophthalmoscopy,"* third edition, 1890) writes as follows: "Chronic changes in the vessels rarely reveal themselves by retinal signs. Those which do occur, the rare coincidence of aneurisms or signs of degeneration of the retinal vessels, with a similar change elsewhere, have been already sufficiently considered in the general account of the changes in the

retinal vessels." Turning to this general account, we find the following statement: "Actual atheroma—*i. e.*, endarteritis deformans—has not, so far as I am aware, been found in the retinal vessels after death, and in cases in which it is well marked elsewhere I have looked for appearances in the retina suggesting its existence, but without success." In explanation of this Dr. Gowers suggests that the retinal arteries are far below the size in which the atheromatous changes are common. He has, however, described a notable diminution in the size of the retinal arteries independently of any special retinal disease in some cases of chronic Bright's disease, as well as irregular contractions of these vessels and perivasculitis, somewhat of the character to which I shall presently refer (*loc. cit.*, p. 210).

Knies ("Die Beziehungen des Sehorgans und Seiner Erkrankungen zu den übrigen Krankheiten des Körpers und Seiner Organe," Wiesbaden, 1893), after referring to the ocular symptoms which may be produced in the eye by extensive disease of the vessels, particularly atheroma, arterio-sclerosis, fatty degeneration, and certain specific diseases, says: "The different anatomico-pathological forms can rarely be distinguished from one another with the ophthalmoscope. Although such vessel changes are found post-mortem in the retina and choroid, they are seen with the ophthalmoscope with comparative infrequency, but not so rarely as was formerly supposed." He then proceeds to quote the examinations of Raehlmann ("Ueber Ophthalmoskopische sichtbare Erkrankung der Netzhautgefäße bei allgemeiner Arteriosclerose, mit besonderer Berücksichtigung der Sclerose der Hirngefäße." *Zeitsch. f. klin. Med.*, Bd. XVI, H. 5 u. 6.), who studied ninety cases of general arterio-sclerosis for the purpose of considering the associated ophthalmoscopic changes in the retinal vessels, and found some changes in practically all cases, and decided changes in 19 to 21 per cent. Hirschberg ("Ueber Altersveränderungen der Netzhaut." *Centralbl. f. prakt. Augenheilk.*, 1890, Bd. XIV, p. 322), in his investigations of senile changes in the retina records analogous observations, and this is my own experience in my investigations of old persons' eyes in the Philadelphia Hospital.

Of particular interest in this connection are the studies of Dr. H. Friedenwald of Baltimore of cases of arterio-sclerosis. Indeed, his work on the changes in the retinal vessels under these circumstances is in some senses pioneer in this country, and deserves unstinted praise. His first paper (*Journal of the American Medical Association*, 1891, XVI, p. 623), published in conjunction with Dr. George J. Preston, records the examination of forty retinas in twenty-three patients suffering from general arterio-sclerosis, in which only seven appeared thoroughly normal. Later, Dr. Friedenwald pursued this subject in an examination of thirty-three cases of arterio-sclerosis, and found, as before, with great frequency, the changes presently to be detailed ("The Significance of Constrictions and Dilatations and the Caliber of the Retinal Arteries." *Arch. of Ophthal.*, 1896, Vol. XXV, p. 177).

The most recent suggestive communication upon this topic is from the pen of Mr. Marcus Gunn (*Trans. Ophth. Soc. U. K.*, 1898, Vol. XVIII, p. 356), and it is to his results, as well as to the results which have been embodied in the foregoing *résumé*, that I wish particularly to call attention, first, because I believe that ophthalmoscopic examination under these circumstances furnishes an important aid in diagnosis and prognosis, and secondly, because it is evident that although ophthalmologists, as is plain from the researches of Raehlmann, Hirschberg, Friendenwald, Gunn and, perhaps, I may be permitted to say myself, have not overlooked this matter, the text-book descriptions of arterio-capillary fibrosis do not give it the prominence it deserves.

The ophthalmoscopic signs which may be encountered in general arterio-sclerosis are:

(1) Alterations in the course and caliber of the retinal arteries, manifesting themselves as (a) undue tortuosity, which is not significant unless, to quote the words of Mr. Gunn, it is associated with other evidence of disease; (b) alterations in the size and breadth of the retinal arteries, consisting of general contraction of one or more branches, or, more suggestively, of alternate contractions and widenings, where, for example, a vessel may proceed with practically normal caliber for a certain distance, then suddenly narrow almost to a thread, again fill out, and again narrow, thus presenting, as it were, a beaded appearance.

(2) Alterations in the reflections from, and the translucency of, the walls of the retinal arteries, manifesting themselves (a) in increased distinctness of the central light streak on the retinal vessel and an unusually light color of the entire breadth of the artery. The vessels, as Mr. Gunn points out, give the impression not only of increased brightness of the central light streak, but of an unusual reflection from the arterial coat. (b) Loss of translucency, so that it is impossible to see, as is possible in the normal state, through the artery an underlying vein at the point of crossing; (c) positive changes in the arterial walls, consisting of whitish stripes, indicating degeneration of the walls, or infiltration of the peri-vascular lymph sheaths.

(3) Alteration in the course and caliber of the veins, together with signs of mechanical pressure, manifesting themselves (a) in undue tortuosity, which, as in the case of the arteries, is not significant except in the presence of other disease; (b) alternate contractions and dilatations; (c) an impeded venous circulation where a diseased artery crosses it.

The last is the sign which Mr. Gunn particularly dwells upon, and which, in my experience, is of the utmost importance. Ordinarily, as an artery crosses the vein, as may be seen by an examination of the normal eyeground, there is no sign of pressure, and the translucent vein permits a view of the artery beneath it. If the walls of the artery are thickened by disease, then it presses upon the vein, pushes it aside, or directly contracts its caliber, so that beyond the point of crossing there is an ampulliform dilatation.

So, also, when the vein overlies the artery there may be a similar contraction of the venous caliber and dilatation on either side of the spot of crossing. (d) Changes in the venous walls, precisely as they occur in the arteries, so that whitish stripes border the vessel, and are indications of degeneration in its walls. Often associated with this one may see varicosities, as already pointed out by Raehlmann, and which are well shown in the accompanying water-color.

(4) Edema of the retina, manifesting itself (a) as a grayish opacity, which may be present in the immediate neighborhood of the papilla, or in spots over the eyeground and along the course of the vessels, looking like a fine gray haze, or in little fluffy islands far out in the periphery.

(5) Hemorrhages, manifesting themselves as linear extravasations along the course of the vessels, roundish infiltrations scattered over the fundus, or sometimes, when extensive, in droplike form, especially in the macular region, forming the so-called subhyaloid hemorrhages. As a result of hemorrhages there are frequently scattered through the eyeground yellowish and whitish-yellow spots bordered with pigment, indicating the atrophy of the elements that has taken place during the course of the absorption of hemorrhage.

It is perfectly evident that all the phenomena which have been described—arterial changes, signs of mechanical pressure, edema and hemorrhages—may be readily explained, as Mr. Gunn has so happily done in his admirable paper, by the alterations which have taken place in the coats of the retinal vessels. These alterations, according to various observers, on microscopic examination have proved to be hyaline degeneration of the whole wall (Hirschberg, Manz), thickening of the intima, due to development of concentric fibers of connective tissue, narrowing of the media and hyaline degeneration, and enormous thickening of the adventitia (Lurje).

From the clinical standpoint, of course, such changes as these are interesting in their relation to diagnosis, prognosis, and, perhaps, I may say therapeutics.

Before entering upon this discussion two questions should be answered: (1) Are these ophthalmoscopic appearances common to all old eyes, that is, are they always present in the eyes of those patients who, by virtue of the years of their lives, are naturally subject to the intrusion of the lime salts? In reply Mr. Gunn may be quoted: "Old age alone does not produce these changes. I have often seen healthy-looking retinal vessels in people seventy to eighty years of age." This statement is readily confirmed by the experience of all ophthalmologists. (2) Are these appearances found only in the eyes of those who have markedly developed elsewhere in the body signs of arterial degeneration, or are these changes marked in proportion to marked changes elsewhere? Not necessarily; indeed, there may be the indications of extensive atheroma of the general arterial tree and none in the retinal vessels. On this point Friedenwald says "the degree of the variations in caliber (dilatations and constrictions) of the retinal arteries does not bear

a definite relation to the signs of arterio-sclerosis in other parts of the body." Again, "the general evidences of arterio-sclerosis may be slight, while the constriction of the retinal arteries may be marked."

First, a case to illustrate diagnosis:

Mrs. —, aged sixty-five, a woman with comfortable surroundings, consulted me because she believed her glasses needed changing, and for relief from recurring attacks of episcleral and conjunctival congestion of a nature similar to that which I have described. The patient was a heavily-built, florid woman, who since 1890 had each winter suffered from an attack of bronchitis of the influenza type, although never very severely. At night she was somewhat asthmatic, complained of being rheumatic in the vague sense in which that term is used, although she had never had an attack of acute inflammatory rheumatism. Recently she had been troubled with drowsiness.

The vision of the right eye was 6/12 after correcting the refractive error, the disc was slightly blurred, the arteries markedly small and clear, the veins unevenly tortuous, and in the macula there were the remains of an old extravasation.

The vision of the left eye was 6/6 after correction of the refractive error, and the ophthalmoscopic appearances are depicted in the accompanying water-color, namely, edema of the nasal margin of the disc; light-colored, somewhat tortuous arteries, the upper temporal artery being markedly and unevenly narrowed and constricted, and bordered by one or two old extravasations; distended veins, presenting numerous alternate contractions, beautifully exhibiting the signs of mechanical pressure where they are crossed by the arteries, the upper temporal vein being so impeded in its circulation that it is fringed with a white border of infiltration, unevenly contracted and gradually dwindled to a tortuous thread, preceded by several varicosities; in other words, in one eyeground all of the appearances which are characteristic of arterio-sclerosis.

The capillaries of this woman's face were somewhat distended over the bridge of the nose and on the cheek bones. The pulse was eighty to the minute, the radial artery being a little rigid to the touch, and more rigid upon the left than upon the right side. The temporals were plainly visible, although not greatly distended. There was no heart murmur. The specific gravity of the urine was 1010 and 1008, respectively (two specimens); there was a trace of albumen in the evening urine; sugar was not present; an occasional hyaline cast was found.

An eyeground such as this, together with the other clinical signs detailed, indicates widespread arterial change. The prognosis is bad. Cases of this kind are always, in my experience, likely to suffer from extravasations elsewhere in the body, and particularly in the cerebrum. Certainly it may be said attention to the patient's arteries was directed by the ophthalmoscopic examination, and necessarily her diet and her habits of life were regu-

lated according to the findings. But for the attack of conjunctivitis which led to the examination of the fundus this condition would not have been discovered.

A very important and interesting relationship in this patient existed between the attacks of scleral and conjunctival congestions and the retinal changes. They almost certainly preceded the lesions in the fundus, and even now—for the patient is still under observation—it would seem that episcleral attacks and retinal extravasations may alternate. In this respect they somewhat resemble the behavior of the recurring subconjunctival hemorrhages already described.

A case to illustrate prognosis: A clergyman, aged forty-six, a native of America, consulted me because he believed he needed change in glasses, which he had worn for a number of years for astigmatism. Ophthalmoscopic examination at that time did not reveal any marked retinal change, except very full tortuous veins, exhibiting characteristically the impeded circulation already described, and some grayness of the optic discs. New glasses were furnished, and three weeks later he reappeared, stating that there appeared to be a faint blur before one eye, which he believed to be due to the fact that the glass was not entirely suitable. Ophthalmoscopic examination now revealed increased tortuosity in the veins, with increased signs of mechanical pressure, and a soft, yellowish-white extravasation in the retina up and out from the disc, near the edge of which were a few striated hemorrhages. The rest of the eyeground was free from disease, nor were there hemorrhages or extravasations in the retina of the left side. The patient had suffered from dyspepsia for a long time, had occasionally had palpitation of the heart and drowsiness. Examination of the urine revealed a low specific gravity and an inconstant slight albuminuria. The arteries were hard and showed high tension. There was a faint mitral regurgitant blowing sound, which Dr. Hare, who examined him from the general standpoint, described as a blurring of the sound rather than a real murmur. The treatment consisted in proper regulation of diet and duties. The patient was told of his precarious condition and his people warned that sudden death might be expected—a warning which was realized two months later, when in the middle of the night he developed signs of intracranial hemorrhage and died in a few hours. Autopsy was not permitted.

The serious prognostic import of retinal hemorrhage is well known, but sometimes it appears to be neglected. Hasket Derby (*Transactions of the Massachusetts Medical Society*, June 2, 1897), writing on the occurrence of retinal hemorrhage after middle age and its bearing on the duration of life, analyzed thirty-one cases, the patients being between the ages of forty-three and eighty-three. Twenty-five of these died after brief illnesses, some with great suddenness. Eleven of this number died of heart disease, fourteen of apoplexy. Mr. Marcus Gunn (*Loc. cit.*, page 365) has also recorded a series of cases which illustrate the intimate association

between such ophthalmoscopic lesions which he has described, and which I have just reviewed, and cerebral vascular disease. The important point demonstrated by the case I have detailed is that these retinal-vessel changes may furnish a prognostic guide even before positive extravasations have appeared. It is for this reason, if for no other, that I wish to add my voice to those who urge that general physicians shall study the appearance of the retinal vessels in many of their patients.

A case to illustrate therapeutics: A married woman, aged forty-three, consulted me because of recurring attacks of conjunctival congestion and a slight blur before the left eye, which was attributed to the mucus gathering upon the cornea. In 1897 the patient had undergone an operation for lacerated perineum, which was followed by an intense secondary hemorrhage and a protracted convalescence. In the summer of 1898 she suffered from malaria, and in November of the same year was again subjected to a perineal operation and again suffered from secondary hemorrhage. The urine is said to have been examined on a number of occasions and found to be normal. Her only complaint, except some lassitude following these hemorrhages and illnesses, when I saw her was the conjunctival hyperemia previously described. The vision of the right eye was normal, but none the less, there was a slight neuritis, a few spots of fatty change in the macular region, and down and in from the disc a whitish exudate. The vessels were typically compressed and unevenly constricted in the manner already described. In a word, they were what I may call examples of Gunn's vessels. The vision of the left eye was also 6/5, and the appearances are depicted in the accompanying water color, namely, slight edematous neuritis, a linear hemorrhage up and in from the disc between the superior nasal vein and superior nasal artery; just below the macula a brownish spot, probably the remains of a former hemorrhage. The arteries were pallid, unusually clear, unevenly tortuous. Where they crossed the superior and inferior temporal veins were the typical appearances of mechanical compression, while along the branches of the central arterial tree distinct perivasculitis was evident; in other words, again a repetition of the appearances now several times described. Owing to the succession of hemorrhages, this patient has been on continuous doses of iron, but otherwise had received no medication. An examination of two specimens of urine revealed respectively 1010 and 1006 specific gravity, a trace of albumen and a few hyaline casts. None of the external arteries, that is to say, the radials, the temporals, etc., were hard to the touch. There was no heart murmur. On the strength of the ophthalmoscopic appearances, at my suggestion, the iron was continued, but in addition the patient was given small doses of iodide of sodium and nitro-glycerine. Whether because of these remedies or because a more careful habit of life was pursued, there was marked improvement both in the general and the local conditions. Sufficient time has not yet elapsed to determine positively whether these therapeutic agents

will make any difference in the appearance of the retinal vessels, and it is with some hesitancy that I quote the case as an example of the advantage of these examinations from the therapeutic standpoint. Still, without such examinations, I do not believe the indications for nitro-glycerine and for iodide of sodium would have come prominently to the front.

In concluding these somewhat desultory remarks on this subject, I beg leave to point out, in the first place, that I have not described anything new. These appearances have been known for many years, but they have not received the recognition they properly deserve. They must be sharply distinguished from the very well-known clinical signs in the retina which are grouped under the general term of renal retinitis, or hemorrhagic retinitis, or the retinitis of Bright's disease. They are part of the symptomatology of arterio-sclerosis, and I presume therefore may be considered part of the symptomatology of a condition which may terminate in a special localization of endarterial changes in the kidney and constitute the so-called Bright's disease. They may be, moreover, evident when there are no special general clinical signs to call attention to the slow invasion of cerebral arteries by degenerative processes which may terminate in rupture and cerebral apoplexy. As a recent reviewer of Tirard's work on albuminuria and Bright's disease says, referring to these changes in the retinal arteries, "their importance as an indication of general arterial disease should be widely known. These changes are often obvious in cases in which the usual retinitis has not developed." I would like to go further, and say they are obvious in cases in which the usual retinitis will not develop, because they are the forerunners of a process which may terminate fatally before the development of fully-established nephritis. (I have also discussed this subject before the Pathological Society of Philadelphia, and have quoted freely from my paper published in its transactions.)

I may summarize thus:

(1) Flitting conjunctivo-episcleral congestions may be the only symptom of masked gout.

(2) Such congestions may be the prodromes of later gouty manifestations in the eye or elsewhere in the body, but also (and most importantly) may be the forerunners, associates or alternates of retinal-vessel changes, which, in their turn, are the indications of general arterio-sclerosis of serious prognostic import.

(3) The same conclusion applies to recurring subconjunctival and recurring subcutaneous palpebral hemorrhages, which seem, however, to be related especially to the chronic form of nephritis, exactly as is the classical retinitis.

(4) Inflammation, hemorrhage and edema, with exudation, are not necessarily the ophthalmoscopic signs of general arterial disease or of its special localization in certain organs, for example, the kidney. It may be manifested with perhaps equal frequency by alterations in the walls of the retinal arteries and changes in the

course and caliber of the veins, together with signs of mechanical pressure where veins and arteries cross.

(5) These retinal-vessel changes may be present when ordinary physical examination does not reveal the signs of endarterial change in the surface vessels of the body generally.

One of America's most distinguished medical teachers was wont to say: "Symptoms are the surface play of disease, which, if correctly interpreted, lead the physician to appreciate the therapeutic needs of the affected organs." Such a surface play, in so far as one organ is concerned, and largely in relation to the affection of one tissue, I have ventured to exhibit. When I remember the long line of my able predecessors in this evening's function, the distinguished men who have graced and now grace your Faculty, and their invaluable contributions to medicine and surgery, I am distinctly depressed by the imperfections of this presentation. Still, as the late Dr. Goodell, quoting the Caliph Omar, was wont to say, "Two things come not back—the sped arrow and the spoken word." And I am comforted, for the sped arrow was found in the heart of an oak, but the spoken words in the hearts of friends.