

**The class of cases of simple chronic glaucoma in which operation is not advisable / by Charles Stedman Bull.**

**Contributors**

Bull, Charles Stedman, 1844-1912.  
Tweedy, John, 1849-1924  
Royal College of Surgeons of England

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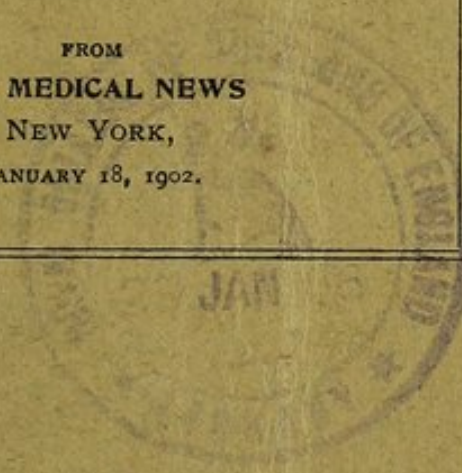
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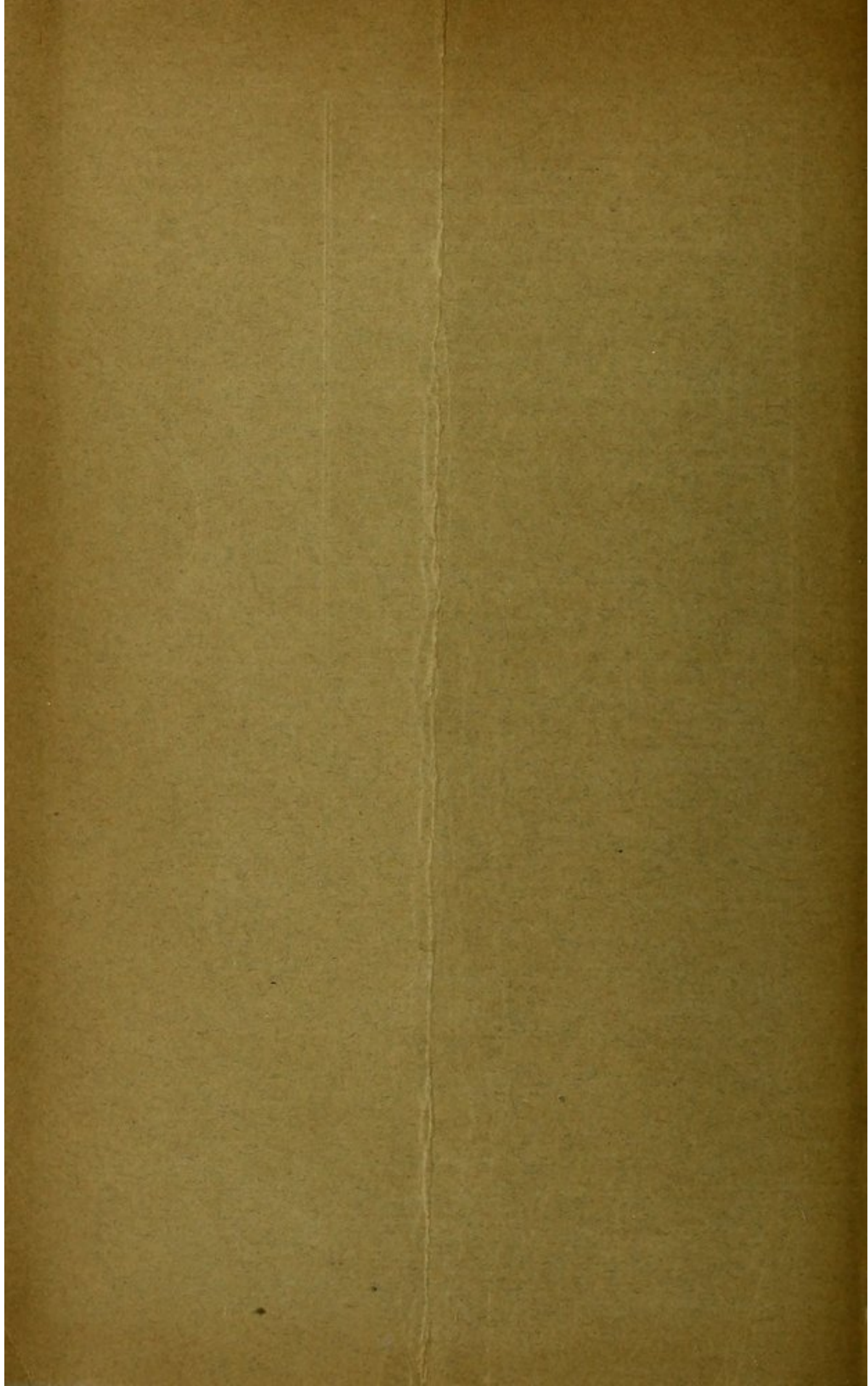
BY  
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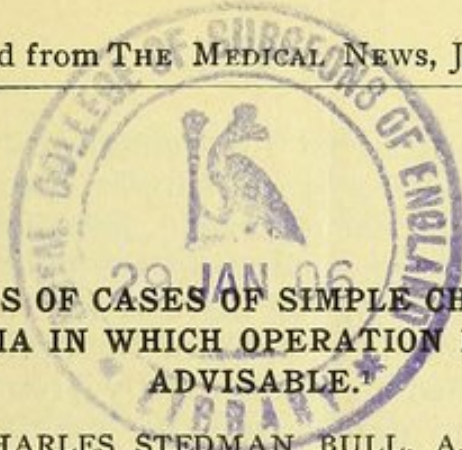








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THE CLASS OF CASES OF SIMPLE CHRONIC GLAUCOMA IN WHICH OPERATION IS NOT ADVISABLE.<sup>1</sup>

BY CHARLES STEDMAN BULL, A.M., M.D.,  
OF NEW YORK.

IN THE years which have elapsed since Von Graefe first suggested the operation of iridectomy for the relief of glaucoma, our views as to the value of this method of treatment in all forms of glaucoma have undergone material modification. Your Chairman has asked me to present to the Section on Ophthalmology a paper upon the subject of "those cases of glaucoma in which operation is not advisable," and, in accepting his invitation, I have decided to confine what I have to say to the subject of *simple chronic glaucoma*.

The complete divergence of opinion as to the relative value of various methods of treatment in simple chronic glaucoma is probably due to a lack of precision in interpreting the real meaning of the various symptoms as they are observed in different cases. In the actual state of our knowledge, it is difficult always to distinguish between the intermediate forms which present themselves to our notice. It is known to us all that some cases are called simple chronic glaucoma by one class of authors, while the same are classed as inflammatory or irritative chronic glaucoma by other authors of equal repute. May it not be wise to regard simple chronic glaucoma as a disease in many respects essentially different from glaucoma with exacerbations? We should

<sup>1</sup>Read before the Ophthalmic Section of the Academy of Medicine, Nov. 18, 1901.



also never forget that the symptoms which are supposed to characterize simple chronic glaucoma, viz., reduction of vision, narrowing of the visual field, and excavation of the optic disk, are not characteristic of the disease, for they are all met with in simple atrophy of the optic nerve.

I am inclined to think, partly from my own experience and partly from the expressed opinions of some of my colleagues on the subject, that the unfavorable view taken of operative procedures in simple chronic glaucoma is often due to our errors in diagnosis. We must learn to distinguish absolutely between simple chronic glaucoma and a diseased condition of the optic nerve with pre-existing physiological excavation, and the distinguishing sign is the increase of the intra-ocular tension. Without this *increase of tension* there is no *glaucoma*. Here is the great difficulty, for in simple chronic glaucoma the increase of the intra-ocular tension is often so slight as to be far from easy to recognize, and in these cases we may readily confound the disease with atrophy of the optic nerve. Moreover, in this form of glaucoma increased tension is not constantly present, and may be absent for hours and even days in succession. In fact, as we know, the disease presents no active symptoms and it is difficult to fix the date of onset. These periods of increased tension should be searched for with the finger-tips placed on the sclera itself and not on the closed lids. I make the examinations frequently at different hours of the same day or different days. I think we are justified in saying that in every case of simple chronic glaucoma there is a slow but progressive increase in the tension, not always to be recognized at first, but which becomes demonstrable after repeated examinations.

Some writers are of the opinion that this false



or pseudoglaucoma simulates the real glaucoma in about half the number of cases of so-called simple glaucoma. If we confound the two diseases with each other, we may be guilty of a double error, for the false glaucoma should never be treated surgically, and, if the case be a true glaucoma, we may deprive the patient of its real surgical remedy. A possible explanation of the failure of both iridectomy and sclerotomy to bring about a cure in all cases in which the tension is not increased may be in the fact that they exert no effect in reducing normal tension, but only produce this effect in cases in which the tension is increased. In studying our cases of glaucoma, we may sometimes gain assistance from observing the existing conditions of the angle of the anterior chamber. The form of the filtration angle varies with that of the ciliary muscle. In emmetropic eyes the angle is wide and the peripheral origin of the iris is variable. In hypermetropic eyes, the peripheral origin of the iris is displaced inward toward the axis of the eye, and the angle of the chamber is narrowed and pointed. In myopic eyes, the origin of the iris is displaced outward away from the axis of the eye, and the angle of the chamber is rounded and wider. Hence the angle is more apt to be closed by the glaucomatous condition in hypermetropic eyes, and less so in myopic eyes.

A careful and frequently repeated study of the field of vision will often yield valuable information, helping us to a decision for or against operative interference. The defects in the field in glaucoma often represent peculiar types, and it should here not be forgotten that disease of the retinal vessels sometimes causes defects of the field of vision which show a certain analogy with glaucomatous defects. We do not always meet with the typical contraction on the nasal side, for



there are frequent exceptions. It is also well to remember that the personal equation of the observer should always be considered in examinations of the visual field. To one observer a field may appear contracted and to another observer uncontracted. But if we find that the visual field is on successive days and at repeated examinations contracted on the nasal side or concentrically, we may be sure that the disease is progressing. If the field be examined with white objects under small visual angles, according to the plan recommended by Bjerrum and Meisling, or by squares of gray paper, as suggested by Holden, we can often demonstrate a much greater functional disturbance of the field of vision than by the ordinary perimetric examinations.

I agree fully with De Schweinitz that the existence of scotomata in the field aids us in forming a prognosis in simple glaucoma. They are frequently the forerunners of subsequent peripheral defects in the visual field. I do not consider, in any doubtful case, that the field is thoroughly mapped out until each meridian has been examined from fixation point to periphery and under varying degrees of illumination, both for white and colors. The scotomata may be central or paracentral, but are topographically different from those met with in atrophy of the optic nerve. We know that the prognosis depends on the type of the disease and the stage of its development. Much also depends, in the chronic cases, upon the amount of degenerative change in the retina, measured by the defects in the visual field.

We may also gain some insight as to the result of an operation in a given case from the condition of the iris and its reaction to myotics, and in some cases this behavior of the iris furnishes a good prognostic guide for operative interference. The most important point in the manage-



ment of chronic glaucoma is that our *diagnosis* should be *correct*, and we should be careful never to base our diagnosis upon the presence of one or even two symptoms, but we must look for them all, even if we are forced to reserve our diagnosis until the patient has been examined a number of times.

The study of the disk in chronic glaucoma is often misleading. Total excavation of the disk as far as its edge often exists without any increase of tension demonstrable by the finger. Schweigger is probably correct in saying that the term "physiological excavation" should only be employed when it involves more than one-third of the papilla and shows at the bottom the lamina cribrosa. The ophthalmoscopic picture of physiological excavation may be produced by glaucoma, and a large physiological excavation with discoloration of the disk often cannot be distinguished from a pressure excavation. Here the diagnosis is very difficult, for the ophthalmoscope cannot tell which process came first. The pre-existing physiological excavation, in consequence of a secondary atrophy of the optic nerve, may eventually coincide all round with the scleral margin of the disk, and give a picture of "typical glaucomatous excavation" without glaucoma. In the optic nerve atrophy, due to spinal disease, we have such a clear clinical picture that we are not likely to err in our diagnosis. In the rare primary atrophy of the optic nerve, however, we may easily err and confound it with chronic glaucoma. Hence these cases should be carefully followed for a length of time. The condition of the iris and pupil is not always diagnostic. A chronic glaucoma may go on to blindness without affecting the reaction of the iris to light. The pupil may be perfectly round and yet the iris be dilated and movable. The condition



of the anterior chamber is not always diagnostic, for, though generally shallow in chronic glaucoma, it may regain its normal depth.

I have seen the diagnosis of glaucoma made from the presence of arterial pulsation. This I consider a mistake. The arterial pulsation is probably often present when not visible. When present in connection with the other symptoms, I regard it as a grave symptom, indicating the possible occurrence of retinal hemorrhage after iridectomy.

The question of tension is probably the most difficult one to settle in chronic glaucoma. Schweigger says that there are *physiologically hard* and *physiologically soft* eyes, and that he does not recognize any normal limit for the tactile hardness of eyes, because the resistance to the finger depends not only on the intra-ocular pressure, but also on the resisting power of the sclerotic, which is very different in different individuals and at different points. In simple chronic glaucoma the increase of tension is very apt to appear in a sudden attack, which at first lasts a brief period and then disappears; but as the disease becomes more chronic, the increase of tension occurs more frequently and lasts longer, until in the pronounced cases it is a permanent feature.

*In What Class of Cases of Simple Chronic Glaucoma is Operative Interference Not Advisable?*—This question may perhaps be best answered by a process of exclusion.

My experience with sclerotomy has not been satisfactory. It has not in my experience given lasting results, though it may be regarded in a measure as preparatory to iridectomy in cases with very high tension, or, in very nervous, uncontrollable patients, as a palliative. What little I have to say under the head of operative inter-



ference will therefore be confined to iridectomy.

Simple chronic glaucoma should always be operated on early in the disease, before much contraction of the field has occurred. The operative effect of iridectomy is more certain and undeniable the earlier it is done. The slightest narrowing of the field, whether for form or color, demands operation once our diagnosis is made. The curative action of iridectomy stands in direct proportion to the increase of tension. Early iridectomy, while the iris is still mobile, the field but little contracted, and the cupping of the disk slight, commonly arrests the disease, at least for a prolonged period, and preserves what sight remains. *Done early*, it offers the best prospect for the arrest of the process, and its effects are either permanent or very prolonged. If the tension is lowered after iridectomy, a favorable result is to be expected. If the tension remains high after operation, we must look for an unfavorable result. If, under the use of myotics, the vision improves and the field widens, it is almost certain that an iridectomy will give a good result. If, in spite of myotics, the visual acuity remains stationary and the field does not improve, the effect of the operation will be less favorable.

In advanced chronic glaucoma with great contraction of the visual field, marked impairment of the vision, undoubted increase of tension and deep cupping of the disk, the prognosis for operation is more than doubtful; it is distinctly unfavorable, and iridectomy should not be done. In those cases in which the contraction of the visual field has approached close to the fixation point, even though the central vision is still good, iridectomy is positively contra-indicated; for the contraction of the field is not arrested, is often



made immediately worse, and may be followed by total loss of central vision.

*What Can Be Done for Those Cases in Which Operation Is Not Advisable?*—Something there is in the way of treatment which may retard the progress of the disease, even though it does not effect a cure. If we can bring about contraction of the iris and lower the intra-ocular tension, even though the field may not be widened nor the vision improved, we at least render the progress of the disease more slow, and for a time maintain the vision at the existing standard. For these results we rely mainly though not entirely on myotics. These are of no use unless they contract the iris and lower the tension. They can never bring about a radical cure. Hence they are of little use in old, advanced cases of glaucoma, in which the iris is atrophied. Of the two myotics, eserine and pilocarpine, eserine is the more powerful agent, but it is the more irritating and tends to develop ciliary congestion. Its use is best combined with cocaine, which contracts the caliber of the ciliary blood-vessels and diminishes the sensibility of the ciliary nerves. It should be remembered that the congestion of the ciliary processes induced by eserine often entirely defeats its desired effect, and, moreover, its prolonged use tends to cause a follicular conjunctivitis in many eyes. The combined effect of eserine and cocaine is myosis with reduction of tension, due to the paralyzing influence of cocaine on both nerves and vessels, which prevents the swelling and congestion of the ciliary processes induced by the eserine. Eserine should be used in the minimum amount and with the minimum frequency which suffice to contract the iris and keep it contracted. The form in which we use the drug is a matter of some practical importance.



The salicylate and hydrobromate compounds are more permanent and less changeable in solution than is either the sulphate or hydrochlorate. When the effect of the eserine in contracting the iris and lowering the tension has been produced, it is well to continue these effects by the use of pilocarpine. Another point to be remembered is that eserine sometimes fails to lower the tension, while pilocarpine succeeds. Wicherkiewicz thinks that this is probably due to the following existing conditions: In a highly developed condition of Müller's fibers of the ciliary muscle, eserine causes marked swelling of the ciliary processes. If in such a case there are a small eyeball, a narrow circumlental space, and a large lens, eserine may bring about complete closure of the space between the vitreous chamber and the posterior chamber, which causes marked obstruction to the exit of fluid from the vitreous into the anterior chamber. This condition does not occur when pilocarpine is used. Hence after the eserine has drawn away the iris from the angle of the anterior chamber and has lowered the tension, it is wise to change to pilocarpine, and allow the congestion of the ciliary processes to subside.

The primary effect of the eserine may be assisted by a hypodermic injection of morphine, five to eight minims of Magendie's solution, which lowers the blood-pressure, lessens secretion and promotes contraction of the iris. I am in the habit of beginning with a solution of eserine salicylate, gr.  $\frac{1}{10}$  to  $\frac{1}{4}$ , and cocaine hydrochlorate, gr. ij, and after two or three days' use of this solution, instilled two or three times a day, I change to a solution of pilocarpine hydrochlorate, gr. ij, and cocaine, gr. i, used with the same frequency. If I find after a time that the iris tends to dilate or the tension to rise,



I revert to the use of the eserine solution for a few days.

Some of the preparations of pilocarpine contain an impurity in the form of *jaborine*, an isomer of pilocarpine, which has a mydriatic action on the iris. This is not a definite single compound, but a mixture of pilocarpine with closely-allied alkaloids, like isopilocarpine. Attention has been called to this point recently by Lilienfeld (Centralblatt für prakt. Augenheilkunde, May and June, 1901), who suggests that the pilocarpine preparations should be first subjected to careful physiological tests, before being placed on the market. This would minimize this danger.

I have occasionally found that gentle massage of the eyeball has been followed by improvement in the vision and deepening of the anterior chamber, and I therefore advise it twice a day as a part of the routine treatment. Before instituting any local treatment, these eyes must be carefully examined for any refractive error, and, when found, this must be fully corrected by glasses. The habits of life of the patient should be regulated as far as possible, and all excesses of every kind should be avoided. The eyes should be employed in close work as little as possible, and with frequent periods of rest. If there be a tendency to constipation, this should be regulated, for it is well known that aperients sometimes produce a very decided effect on the tension and congestion of the eye. Avoidance of everything tending to the production of anxiety or mental disturbance is an additional precaution to be distinctly impressed upon the patient.

Regular hours and habits, and sound, refreshing sleep are all important in the management



of this rather hopeless class of cases. Any existing gouty or rheumatic tendency should be treated by appropriate remedies, preferably the sodium salicylate, alternating with alteratives and strychnine.



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