

necessarily follow that vascular relaxants are indicated; it may be that cardiac tonics are more urgently needed.

2. Excessive blood pressure of itself does not constitute an absolute indication for drug treatment, nor does it serve as reliable ground for a bad prognosis. It is remarkable how well Nature accustoms herself to severe circulatory resistance, so that cardiac integrity is maintained and symptoms remain absent for long periods, with pressures of 200 mm., and even much higher. The writer has patients at present under observation whose blood pressure, covering a period of two and three years, has seldom been below 200 mm., yet they have enjoyed a good measure of activity and freedom from symptoms. One individual whose blood pressure has ranged from 200 mm. to 265 mm. for one year has remained practically free from symptoms. It is well to accent the point that because the blood pressure is high it does not necessarily follow that it must be reduced by drugs in order to insure either the patient's safety or comfort.

3. Active vasodilators (nitrites) may occasionally be necessary to meet emergencies, such as stenocardia, angina pectoris, apoplexy prodromes, etc.; under such circumstances they are perfectly justifiable and may be given with a freedom not at other times permissible.

4. Blood pressure may be reduced temporarily by vasodilator drugs, but it is very difficult to produce a permanent lowering except in the presence of a weak heart. This is easily understood when we remember that vascular pressure is a compound of ventricular propulsion and peripheral resistance. If you modify the latter in the presence of a strongly acting ventricle, the pressure will be maintained by the heart. Modify the peripheral resistance in the presence of a weak ventricle and the blood pressure will fall with a simultaneous increase in the pulse rate, due to inadequate efforts on the part of the heart to maintain pressure. It follows, therefore, that a material fall in blood pressure which is more than temporary, due directly to vasodilators, especially if accompanied by quickened pulse rhythm and not marked by improvement in the patient's sense of well-being, is apt to be unfavorable, being ominous of a weak heart.

5. A sustained high blood pressure (over 200 mm.), if accompanied by symptoms of disquieting character, may render a course of vasodilator medication advisable. The drug chosen should be slowly and cautiously introduced, closely watching its effects on blood pressure, pulse rate and subjective state of the patient. The sudden employment of full doses of an active vasodilator is to be condemned, as it may produce serious consequences to the patient's heart and nervous system. A fall of 10 to 15 per cent. is, as a rule, all that is necessary or judicious to accomplish by drugs.

6. The benefit derived from vasodilator medication can not be properly gauged by the blood pressure record. The patient's subjective comfort and more especially the pulse rate form a better index of the effect produced. The most favorable influence in my experience has been in cases where no manifest fall in blood pressure has resulted, but subjective disturbances have disappeared, and the pulse has diminished in frequency. I should say as the result of personal observation that the case which above all others will be best influenced by vasodilators is one in which the blood pressure is high (over 200 mm.), and in which no direct response to the drug in the pressure record is apparent, but merely the indirect response in pulse rate and bodily comfort, as above noted.

7. The employment of vasodilators in the late stages of Bright's disease with cardiac dilatation, dropsy, etc.,

is practically useless, and were it not for the fact that the vasomotor control of the peripheral circulation is too much disturbed to respond, they might do harm. The fact that the case was primarily one of high tension forms no excuse for continued reliance on these drugs under such circumstances.

103 State Street.

GONOCOCCUS-CONJUNCTIVITIS IN ADULTS AND INFANTS.

A REVIEW OF TREATMENT AND RESULTS IN ONE HUNDRED AND TWENTY-NINE CASES IN THE PHILADELPHIA GENERAL HOSPITAL DURING THE PAST SIX YEARS.*

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The study of the following 129 cases of gonococcus infection of the conjunctiva, occurring in the services of Drs. G. E. de Schweinitz, C. A. Oliver, H. F. Hansell and J. W. Croskey in the Philadelphia General Hospital, covers a period extending from May, 1900, to July, 1906.

For a convenience and for more accurate study such a series would naturally divide itself into two groups:

1. Those in which the infection occurred subsequent to labor, or gonococcus-conjunctivitis.

2. Those in which the infection could be traced directly to birth, or conjunctivitis neonatorum.

In using the term gonococcus-conjunctivitis in preference to gonorrhea, I follow the suggestion of Holt, because it eliminates a factor which is wholly lacking in many of these cases. Of the 129 cases that came under observation, 72 cases could be included under Group 1, or gonococcus-conjunctivitis, and 57 under Group 2, or conjunctivitis neonatorum. Of these 72 cases of the former involving 106 eyes, 54 cases occurred in adults, 44 of which were males and 10 females, while the remaining 18 cases were among children and only 4 of these were of the male sex. The cause of this apparent influence of age on the frequency of this affection in the two sexes is obvious and will be referred to indirectly later on.

Among the adults there was a bilateral involvement in 19 cases and a unilateral involvement in 35 cases and, strangely enough, in the latter series the left eye was involved twice as often as the right, the actual numbers being 23 and 12. Among the children 15 cases were bilateral and 13 unilateral.

GROUP I, OR GONOCOCCUS-CONJUNCTIVITIS.

Positive reports of bacteriologic examinations were obtained in 48 cases, and, while in the remaining 24 no record of such an examination could be found, 16 of them had associated gonorrhea, which leaves but 8 partly unaccounted for. Of these a history of accidental infection from probably contaminated eyes was obtained in the cases of 2 female children and 1 female adult; one male adult had had two previous attacks of gonorrhea the last 6 months before his eye became involved, but stated he had no urethral discharge at the time; another male adult denied gonorrhea, but there was no record of an examination. In the remaining cases, two male adults and one male child, no data of any kind were recorded. It should be stated that over half of the rec-

* Read before the Section of Ophthalmology of the College of Physicians of Philadelphia, Nov. 20, 1906.

ords that failed to give bacteriologic data were filed before the present efficient laboratory system was instituted, and some of them were due to the failure of the resident to record results of such an examination.

On admission to the eye wards 42 of the 106 eyes were found to have some corneal involvement, while no data of the same could be found in 64. Sixteen of these 64 eyes that entered with clear corneæ subsequently developed some abnormalities in this structure, so that on discharge 48 corneæ had remained clear and 58 had undergone some change consequent to the gonococcus infection.

In those cases in which no vision was recorded and in which some corneal involvement had occurred, by knowing the site of the lesion and such remarks as "cornea much clouded," "macula near corneo-scleral junction, etc., a crude estimate of the probable effect on vision could be made. It should be stated that where the eye was lost or only light perception remained, such conditions were almost invariably recorded. By such procedure it was found that of these 58 eyes that suffered some corneal change, 8 were enucleated, 21 were blind or had but light perception, 10 had a moderate reduction of vision, while in 19 sight remained unimpaired or was but slightly affected. It is thus seen that where the cornea became involved it resulted in a practical loss of just 50 per cent. of the number of eyes affected.

If we follow out the 16 cases in which the cornea became involved while in the house, we find that 2 eyes were enucleated, 4 were blind or had but light perception, 3 showed a moderate reduction in vision and there was but slight or no impairment in 7 eyes. It may be stated that one of these 16 eyes had a peripheral ulcer that perforated as the result of a blow from the patient's thumb, but owing to the site of the lesion he recovered with some vision. It can thus be seen that in 6 of these 16 eyes, or 37.5 per cent., there was practically a total loss of vision.

It was rather interesting to trace out how many of these 72 cases of gonococcus-conjunctivitis were due to a probable autoinfection. As above mentioned, there were 44 cases among male adults, and, of these, 32 had a urethritis, while in 12 the records failed to state its presence or absence. Of the 4 male children involved there was no record of any associated gonococcus infection; 5 of the 10 cases in female adults had the clinical manifestations of a gonorrhea, while in the remaining cases no note was made as to its presence; 6 of the 14 cases in female children also had the clinical manifestations of a gonorrhea, bacteriologic examination verifying the diagnosis in 4 cases, while in one other a suppurating bubo developed. It is not likely that any one familiar with the conditions at Blockley would take exceptions to the conservative statement that probably 90 per cent. of the male adults treated for gonococcus-conjunctivitis could be shown to have an associated gonorrhea if proper measures were pursued. Also, that if carefully prepared smears were made from the cervix or from Bartholin's and Skene's glands in the female, fully 50 per cent. of those delivered at the maternity and who suffered from gonococcus-conjunctivitis would show some form of associated gonococcus infection. Such being the condition of affairs, these cases do not excite the same amount of sympathy as do the children that come under observation for gonococcus-conjunctivitis, where, if there is a vaginitis existing in the female, it is almost invariably one of accidental infection.

All of us are familiar with the increase in recent years of gonococcus-conjunctivitis in young girls, due probably to the increased frequency of vulvo-vaginitis in these children. While vaginitis or vulvo-vaginitis in children probably belongs more accurately to gynecology, nevertheless it has a distinct bearing on ophthalmology, and, in my opinion, deserves more consideration than has been accorded to it in the past.

A number of excellent papers have been written on this subject in recent years, among which may be mentioned one by Dr. Sara Welt-Kakels¹ and another by Dr. Emmett Holt.² As is now well known, this affection has a marked tendency to become epidemic in institutions for children and is exceedingly difficult to stamp out, probably more so than any of the so-called infectious diseases of childhood. Holt found that in the early years of his experience with this affection in the Babies' Hospital in New York that sterilization of the napkins was not sufficient. Subsequently all cases were isolated, given special nurses and separate personal utensils, wash rags and sponges were forbidden and a separate laundry established; but with all this they were not fully able to control the disease. It was not until bacteriologic examinations were made in all children applying for admission that they obtained some control over this intractable and markedly infectious condition. He states that during eleven years but 6 cases of gonococcus-conjunctivitis developed in the house, and 4 of these were among the 273 cases of vaginitis. It is also interesting to note that there were 26 cases of gonococcus arthritis, 19 of which occurred among male children; of these 19 cases but one had a demonstrable associated gonococcus infection and that was a conjunctivitis. Smears were made from the eyes, nose, mouth and urethra with negative results. One of these cases of arthritis without other demonstrable gonococcus infection was the probable origin of subsequent cases of vaginitis that developed in the same ward.

It is but fair to assume that what has occurred in the New York institutions has likewise been going on in our own city. Without any effort at investigating the true state of affairs, I know of three hospitals in this city that have had epidemics of this affection within the past six months, and one of these was compelled to refuse admission to all female children during a portion of the past summer. In Blockley since March 27, 1906, there have been 38 cases among 183 children without the development of one case of gonococcus-conjunctivitis. This is unquestionably due in a great measure to the rigid routine now in force, as may be illustrated by the following case: A child who had had a vaginitis for some time was discharged on the urgent demands of the parents, only to return a week or some ten days later with a well-developed gonococcus infection of the conjunctiva. Among the 14 cases of gonococcus-conjunctivitis in female children occurring in the present report, the records show that 11 were admitted to the eye service from outside sources. As to the 3 that were transferred from other house services, one had vaginitis and later developed a bubo, while in the remaining two no note was made as to the existence of a vaginal discharge.

I have dwelt more fully on this condition of vulvo-vaginitis in children because it seems to me that we can no longer look on a gonococcus infection of the conjunctiva as a condition which affects the eye alone, but must regard it as a possible origin of infection that may

1. N. Y. Med. Jour., October, 1904.

2. Ibid., March, 1905.

jeopardize and mar the whole future usefulness and life of the individual so affected. While I appreciate the many difficulties that often attend the treatment in private practice of these cases of gonococcus infection of the conjunctiva, it seems to me that all such cases, especially where other children are in the house, must be treated with the same restrictions that one would institute in a case of any of the so-called infectious diseases. It also seems essential that the nurse in charge should be told of the increased susceptibility of the vaginal mucosa in children and be given definite instructions for guarding against a possible infection of the same. As can be shown by this report, and as would naturally be expected, the greatest amount of danger to the eye from a specific vaginitis does not arise among hospital cases, but in cases outside the same or where they have been discharged from these institutions before a definite cure has been established.

With a knowledge of this increasing prevalence of gonococcus infection in young girls, in my opinion, ophthalmologists would not be adopting a too radical procedure to have a vaginal examination made in these cases immediately on their admission to the general eye wards. This could be readily done at the time the child is bathed without in any way attracting the attention of the patient to the examination desired.

Among the 54 cases in the present series that occurred in adults, 6 gave histories of accidental infection, these being equally distributed between the two sexes. Of the males, one attributed the infection to a public towel, another to sleeping with a man who had a purulent discharge from the eye, and the third, the day before the eye became involved, had a foreign body taken from his eye by means of a handkerchief borrowed from a friend. Needless to say, all of these strenuously denied gonorrhea, and no record could be found of such an associated affection. As to the women, one on the day previous to her first symptoms examined the inflamed eye of a friend, another nursed a child whose eye became sore three days after birth, while the third case was probably infected by her husband who had an acute gonococcus urethritis at the time her eye became involved. This last case I sent into the hospital and it may have been an autoinfection, but, if so, her original infection was probably of recent date, for I was told she had none of the clinical manifestations of a gonorrhea one month before, at which time she was delivered of a healthy baby who failed to develop a conjunctivitis, and no instillation was used after delivery aside from boric-acid solution. By way of interest I may add that this eye showed a virulent infection and quickly ran a destructive course and was finally enucleated.

In reference to the children, as above stated, none of the 4 cases in males gave histories of an associated gonococcus infection. While in but 6 of the 14 females was there recorded a history of co-existing vaginitis.

GROUP II, CONJUNCTIVITIS NEONATORUM.

Taking up the 57 cases of conjunctivitis neonatorum, we found that 24 cases developed in the house and 33 were admitted from outside sources. These were pretty evenly divided between the two sexes, 27 being males and 30 females. Inasmuch as during the past six and a half years, which is the interval covered by the present series of cases, there were delivered, in the maternity wards, some 1,076 infants, it is evident that 2.2 per cent. of these children developed conjunctivitis neonatorum. Of the whole number of cases, 52 were bilateral

and 5 unilateral, making the total number of eyes involved 109. Records of bacteriologic examinations were found in nearly all of these cases, 50 giving positive reports, 3 were negative and in 4 cases no note could be found of such an examination, although in one of these the father was known to have a urethritis and the mother a vaginal discharge. Of those cases credited with negative reports, one had but one examination made, was born in the house, developed symptoms two days after birth and had the clinical manifestations of a conjunctival gonococcus infection; another likewise had the clinical symptoms and only one bacteriologic examination, but was admitted from the street, while to the third these same conditions would apply, with the exception that this infant had, in addition, a vaginal discharge.

It is now the rule at Blockley to obtain three negative reports of at least 24-hour intervals before discharging the case, unless a premature discharge is demanded by the parent. This seems to be a good working rule, but that it is none too rigid may be shown by one case in which three successive negative reports were obtained, only to be followed by five positive ones, before further negative results were determined. Another case gave 6 successive negative reports and then a positive one, while numerous others showed two successive negative examinations that were followed by positive ones. At this point it may be well to refer to the above-mentioned premature discharge of these cases. The records show that at least 7 cases were discharged on the demand of the parent before an effectual cure had been established, and 4 of these gave positive reports on their last bacteriologic examination. It seems to me that it would be well to follow up these cases after their departure from a municipal institution, such as the Philadelphia General Hospital, and not allow them to pass from medical observation for days or weeks at a time, as is probably often the case, this interval being largely determined by the apparent condition of the eye. This difficulty could be overcome by direct communication from the hospital to the family physician, if they have a doctor acting in this capacity, or by having these cases visited by either the so-called district physician or the medical inspector in whose district the case resided, for it is well known that medical advice given to the majority of these patients on their departure from a hospital is woefully neglected and still more frequently absolutely unheeded. In several instances where these cases were referred to outside sources, probable serious consequences were averted.

On admission to the ward of these 109 eyes the cornea was clear in 95, while 14 revealed lesions of varying degrees of intensity. While in the ward, or on discharge, the cornea continued to remain free from any pathologic process in 84 eyes, showing that in 11 eyes corneal changes had occurred while they were under observation.

The probable effects on vision produced by the corneal changes in the 25 eyes showing such involvement at some time during their treatment was as follows: 8 were blind or had but light perception, 7 of these cases being admitted from the street and one from the house, while the remaining 17 cases had various degrees of impairment, several probably escaping with vision unaffected. Among this last number 14 were admitted from the outside and but 3 from house services. Concerning the 11 eyes that developed corneal changes while

under observation, 4 were blind or had but light perception, 3 of these entering the ward from without and one from within the house, while 7 had some probable visual defect, 5 of these entering the institution from the street and two being transferred from other wards.

The mortality in the 57 cases above reported was high; 11 of them dying after varying terms of treatment as the result of associated gastro-intestinal or pulmonary lesions. In fact it may be stated that a large number of the infants that came under observation showed marked evidences of malnutrition, and in two instances the records showed co-existing evidences of hereditary syphilis.

TREATMENT.

Before referring to the specific treatment instituted in these two groups of cases, it seems appropriate to allude to a condition which frequently has a direct bearing on the ultimate result in these cases. In gonococcus infections of the conjunctiva where success or failure of treatment is usually dependent on the condition of the cornea, we should take some cognizance of one of the important factors producing a change in this structure. I refer to the excessive chemosis of the conjunctiva which is so common in this affection and which is very frequently the cause of corneal involvement by its impinging on this structure.

Probably every observer has seen cases of slight corneal haze clear up after incisions were made in a much chemosed conjunctiva. Such being the case, how easy it would be to attribute the saving of the cornea to medical rather than to surgical procedures. Hence I believe we should know in what cases scarification was used and how much of the success attained was probably due to this procedure. Unfortunately I could not find any data bearing on this important factor.

In analyzing this series I have drawn the percentages from the number of eyes rather than from the number of cases because it seems to be the more accurate, for the latter method would fail to state whether the cornea became involved in one or in both eyes and it would also probably cause other faulty conclusions as to the true conditions. The treatment sheets filed with the records show that argyrol was used routinely by but one of the four visiting chiefs. Such being the case, it is but fair to surmise that in the majority of cases the severe infections were treated with that preparation in which the attending surgeon had the most confidence. Within the past nine months I have had the privilege of hearing three of the visiting surgeons express their preference for nitrate of silver, and, judging from the frequency in which this silver salt was used by the other surgeon in attendance, he probably had the same preference.

In the cases about to be referred to, the patients were put to bed on their admission to the eye ward, appropriate treatment was instituted to correct any constitutional impairment and, needless to say, when any associated gonococcus infection existed, proper measures were employed to combat the condition. It also seems proper to allude to the faithful and efficient nursing which has been such a notable feature in this series of cases, and, in fact, is an essential factor in the proper management of the affection. Atropin and eserine were used in those cases in which they seemed indicated.

GROUP 1.—*Gonococcus-conjunctivitis*. In these cases cold was consistently used in the early stages of the

affection unless there was some co-existing corneal involvement. Dr. Miles Standish states³ that he would regard heat as preferable if the aim of the surgeon is to reduce swelling. If to affect further growth of the gonococcus, he refers to Kolle and Wassermann's statement that a growth of this organism is inhibited at the temperature of 86 F. Dr. Standish took the temperature of the conjunctival sac in a patient with gonococcus-conjunctivitis before the application of ice and found a temperature of 100 F. After the application of cold for 22 hours the temperature was reduced but 2 degrees; as a consequence he regards the application of cold as useless in inhibiting the growth of the organism. Dr. Weeks, in referring to this statement, stated that he had reduced the temperature of the conjunctival sac to 92 F. by the application of cold which was at least sufficient to retard or limit the growth of the gonococcus. Dr. de Schweinitz, in the last edition of his book, states that in a certain number of cases of gonorrheal conjunctivitis in adults, during the early stage, cold is not only most agreeable to the patient, relieving pain and irritation, but of distinct value in checking the inflammatory process and the movement of the bacteria.

In reference to the solutions used for cleansing, boric-acid solution was given the preference, with potassium permanganate a close second, while bichlorid solution, formalin and silver nitrate were each used in about an equal number of cases and would rank a poor third. It may be said that in association with these sterile water and physiologic salt solution were used in some cases.

THE SALTS OF SILVER IN GONOCOCCUS-CONJUNCTIVITIS.

The various silver salts used were the nitrate in 34 cases, argyrol in 20 cases, protargol in 2, nitrate of silver with argyrol or protargol in 9; no silver preparation was used in 5, and in 2 cases the treatment sheet was missing from the records.

To obtain any idea of the effects of treatment the only cases available are those which entered the institution with clear cornea. Of these the records showed that silver nitrate was employed in 31 eyes, with subsequent involvement of the cornea in 8, or 25.8 per cent.; argyrol in 20 eyes, with corneal involvement in 4, or 20 per cent.; protargol in 4, with no subsequent corneal changes; nitrate of silver and argyrol in 6 eyes, with corneal involvement in 2, or 33 1/3 per cent.; no silver preparation in 2, with one eye developing corneal changes, or 50 per cent., and in the case of one eye that revealed corneal involvement the treatment sheet was not among the records. It is thus shown that 16 of the 64 eyes above enumerated developed some abnormalities in the corneal tissues. Among these nitrate of silver was used in 2 eyes that were enucleated, one that was blind or had but light perception, one that had a moderate reduction of vision and 4 that had slight or no impairment. So that among the 31 eyes in which nitrate of silver was used there was a practical loss of the eye in 3 cases, or 9.67 per cent. In the eyes treated with argyrol 2 were blind or had but light perception, one had a moderate reduction, while another had but slight or no impairment of vision. Here the practical loss of eyes would equal 10 per cent. In the 2 that suffered corneal changes when treated with nitrate of silver and argyrol one had a moderate reduction and another slight or no reduction of vision. There was slight or no impairment of sight in the one case

with corneal change where no silver preparation was used, while the process involving the cornea in the eye where no treatment sheet could be found, resulted in a blind eye.

Standish³ reports 32 cases treated with protargol with corneal involvement in 34 per cent. and 23 cases treated with argyrol with subsequent corneal changes in 30.5 per cent. He reports⁴ an additional 29 cases treated with argyrol, so that in all he had treated 52 cases with this preparation with subsequent corneal involvement in 22 cases, or 42 per cent.

Standish, since the appearance of argyrol, has given the preparation a thorough trial and evidently still regards it as our best method of exhibiting silver in gonococcus infections of the conjunctiva, despite Derby's most interesting paper on the bactericidal properties of the various silver preparations now on the market. Derby,⁵ in his laboratory experiments, used the *Staphylococcus pyogenes aureus* instead of the gonococcus owing to the difficulties attending the propagation of the latter by our present laboratory methods. He found that nitrate of silver in 0.5 per cent. to 2 per cent. solutions killed the culture in 2 to 5 minutes and that an exposure of 30 seconds to a 0.5 per cent. solution was sufficient to prevent its growth. Protargol in from 2 per cent. to 4 per cent. solutions killed in from 3 to 5 minutes, while a one-minute exposure prevented growth. Collargol in a 4 per cent. solution failed to prevent a growth after an exposure of an hour. Ichthargan and argentamin in weak solutions both killed the growth after an exposure of 4 minutes, but he adds that both are very irritating.

He states that argyrol's bactericidal properties are very weak and that a large series of observations gave a growth after an exposure of 1 to 2 hours to solutions the strength of which varied from 10 per cent. to 50 per cent. He calls attention to the experiments of Verhoeff and confirms his statements that if human blood serum be added to solutions of sodium aurate and protargol their bactericidal properties are destroyed. He also states that he found that the action of Lugol's solution and bichlorid solution of the strength of 1:1000 was much retarded by serum such as hydrocele fluid and bovine blood serum.

GROUP 2.—*Conjunctivitis Neonatorum*. Here I deem it necessary again to refer to the general nutrition of the majority of the cases that come under observation in the Philadelphia General Hospital, a factor which has no little bearing on the ocular results in these cases.

Inasmuch as the vast majority of these infants come from the lowest social strata in the city, poverty, ignorance and negligence are responsible for the advanced stages of malnutrition so frequently seen on their admission and renders a prognosis grave, not only from an ocular aspect, but from a systemic one as well.

In taking up the cases in this group we find that cold was used in the initial stages in the majority of cases, but not as consistently as in Group 1. For cleansing, boric acid was used in 36 cases, potassium permanganate in 14, formalin in 5 and bichlorid in 2 cases. Here, as in Group 1, sterile water and physiologic salt solution were used with the above in some cases.

THE SILVER SALTS IN CONJUNCTIVITIS NEONATORUM.

As to silver, the nitrate was used in 32 cases, argyrol in 8, nitrate of silver and argyrol in 9, the nitrate and

protargol in 1 and no silver preparation in 7 cases. It is interesting to note the result in this last group, for these 7 cases treated without any silver preparation recovered with the cornea intact or at least no note of any lesion could be found on the records. Whether the result obtained in these few cases was influenced by the less amount of manipulation required, by the character of the infection or by the few cases reported, can not be determined, but probably all were contributing factors.

Referring again to those instances in which the eye was free from corneal involvement on admission, we find that 50 of these eyes were treated with nitrate of silver, with subsequent corneal involvement in 6, or 12 per cent.; 14 eyes were treated with argyrol, in which but 1 developed corneal changes, or 7.14 per cent.; 16 with nitrate of silver and argyrol, with 2 showing corneal changes, or 12.5 per cent.; 2 with nitrate of silver and protargol, in both of which the cornea became involved, while in 13 eyes no silver preparation was used and, as above stated, none of these developed abnormalities of the cornea. Standish reports 50 cases treated with nitrate of silver with corneal involvement in 5.6 per cent.; 150 cases treated with protargol, with corneal changes in 2 per cent., and 201 cases with argyrol in which only 4 cases, or 2 per cent., developed some corneal abnormality.

In the 11 eyes that developed some change in the corneal structure while under observation, the treatment was as follows: With nitrate of silver one eye was blind or had but light perception, while in 5 there were varying degrees or no visual impairment. This gives a total loss of vision in 2 per cent. of the eyes so treated.

With argyrol one eye became blind or a total loss of vision in 7.14 per cent. In the 2 eyes with corneal involvement treated with nitrate of silver and argyrol, neither resulted in a destruction of vision, while in the 2 treated with nitrate of silver and protargol the corneal changes were extensive and produced blind eyes.

In conclusion, it may be noted that at Blockley both the Credé method and the instillation of argyrol are used at the maternity. At the University maternity, argyrol has been consistently used during the past year or two, while at the Preston Retreat I have been told that argyrol was abandoned about one year ago and that the Credé method is now exclusively employed. At the Maternity Hospital the Credé method alone is used.

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A CONTRIBUTION TO THE STUDY OF THE OPSONINS.

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While engaged in the study of the opsonins there arose the following questions which have not received appropriate consideration in previous publications and which, nevertheless, are deemed important:

1. What influence has the strength of the bacterial emulsion on the phagocytic index and the percentage of phagocytizing cells?

To this end an emulsion of the *Staphylococcus aureus* of definite strength was prepared and progressively diluted; the serum and corpuscles came from a healthy individual. The results are shown in Table 1.

In this table it will be observed that the phagocytic index and the percentage of phagocytizing cells are, generally speaking, in direct proportion to the strength of the bacterial emulsion. This influence of the varying

4. Ophthalmic Record, August, 1906.

5. Boston Med. and Surg. Jour., Sept. 27, 1906.