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By
SYDNEY STEPHENSON, M.B., F.R.C.S., D.O.,
Ophthalmic Surgeon to Queen Charlotte's Hospital, London.

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# OPHTHALMIA NEONATORUM.*

By SYDNEY STEPHENSON, M.B., F.R.C.S., D.O.

*Ophthalmic Surgeon to Queen Charlotte's Hospital, London.*

As from April 1st, 1914, cases of ophthalmia neonatorum were compulsorily notifiable by medical practitioners in England and Wales, including London. The notification must be made to the Medical Officer of Health of the district. For present purposes, following the Public Health (Ophthalmia neonatorum) Regulations, 1914, we shall define ophthalmia neonatorum as "a purulent discharge from the eyes of an infant, commencing within twenty-one days from the date of its birth."

My personal experience teaches me that the disease is not met with so frequently nowadays among the hospital population, as when I first went into practice some twenty-five years ago. Among better-class folk, it has never been a common malady.

At the same time, it is only right to say that the experience of some other surgeons is not in accordance with my own. For example, Ernest Thomson,[1] who has analysed the figures of the Glasgow Eye Infirmary for the thirteen years 1894 to 1906, both inclusive, finds that ophthalmia is not diminishing in that large industrial centre. The mean percentage of the first six years of the series was 0·568, and of the last seven years, 0·497, so that at most Thomson admits a tendency to diminution, since the difference between the two sets of figures amounts only to 0·071. Again, writing of Birmingham, J. Jameson Evans[2] states that the percentage of ophthalmia to other cases of eye disease, attending the local eye hospital, remains the same as it was twenty years ago, and is only 25 per cent. better than it was in the preceding decade.

In view of the statements of these and of some other writers, it must be admitted, I fear, that the reduction in the

* A lecture delivered to the candidates for the Diploma in Ophthalmology of the University of Oxford.

number of cases has been neither so great, nor so universal, as was once hoped and believed. Future statistics are likely to show an actual increase, since the definition of ophthalmia neonatorum, as quoted above, is necessarily a very elastic and wide one, and few cases will now escape official record.

Two points will readily be conceded by those conversant with ophthalmia neonatorum :—

1. That the malady accounts for upwards of 10 per cent. of all cases of blindness.

2. That it is still, as it has been for many years, the cause of at least one-third of the blindness in inmates of British Blind Schools.

The British Medical Association Committee on Ophthalmia Neonatorum, over which I had the honour of presiding in 1909, was constrained to admit that "cases of ophthalmia have been found to occur amongst cases attended by medical practitioners, as well as amongst those attended by midwives." The admission is significant as coming from such a body, although it fails to convey a full idea of the mischief. Indeed, it is now becoming recognized, by those who are in a position to know the facts, that ophthalmia is by no means limited, or almost limited, as once believed, to the offspring of mothers attended in their time of trouble by midwives. On the contrary, it appears to be even commoner when they are attended by medical men. Of 62 cases seen by me in hospital work, a medical practitioner had been in attendance upon the mother in rather more than one half (37). Stephen Mayou[3] investigated 162 confinements complicated with ophthalmia, and ascertained that 90 had been attended by medical men, and 72 by midwives.

If we may judge from the report, issued in 1912, by the Massachusetts Eye and Ear Infirmary, matters are even worse in America, where much attention has recently been paid to the disease. "The medical men of Massachusetts and not midwives," trenchantly states the report, "are responsible for blindness due to ophthalmia neonatorum." "Out of 388 cases under observation in this Infirmary," it continues, "360 had been attended by physicians and only 10 by midwives." According to the Report of the Committee on Prevention

of Blindness of the American Medical Association, published in 1912, in New York, where ophthalmia is notifiable, 40 per cent. of the births are attended by midwives, yet twice as many infections occur in the practice of the physicians as of the midwives.

This is indeed a sorry state of things, when we reflect that the disease is eminently preventable. Until it is recognized that the occurrence of ophthalmia reflects little credit upon those in charge of the labour, and that to-day it is actually commoner in labours attended by medical men than by midwives, I am convinced, in my own mind, that no material progress will be made in the prevention of a disease, which still ranks as the most fertile cause of blindness.

So far as England is concerned, the position is not a little anomalous. No female may practise as a midwife, unless she holds the certificate of the Central Midwives Board, and by the rules of that body, every midwife is compelled, under penalty of condign punishment, to adopt certain simple precautions to prevent ophthalmia in every case she is engaged to attend. For neglect of this duty women have again and again been struck off the roll. On the other hand, medical men are under no such obligation. Yet precaution is no less necessary in the one class than the other, and the position is rendered even more incongruous when it is stated that the total number of labours is about equally divided between doctors and midwives.

I urge (by no means for the first time) that preventive measures should be taken by medical men at every birth, wholly aside from the social standing or wealth of the parents. Inasmuch as it is now known that ophthalmia is due to venereal causes in a proportion of the cases only, the stigma once thought to be implied in the adoption of those measures no longer exists, and with it, the last shadow of an excuse for not adopting them in every birth.

Of all chemical agents employed in the prophylaxis, there is almost an unanimity of opinion that the palm must be awarded to the 1 per cent. solution of silver nitrate, of which a single drop is to be applied to the baby's eyes as speedily as possible after birth of the head. During the last few years the advantages of two other agents have been urged:

1 per cent. silver acetate (Zweifel), and 5 per cent. sophol (v. Herff). For the former it is claimed that it gives rise to no reaction (the so-called *Argentum Katarrh*), and that it has no tendency to become concentrated still further by evaporation, since the solution employed is already practically a saturated one. Sophol is said to be as efficient as it is non-irritating.

At the same time, the use of these or other chemicals would be a misfortune, if it led to the neglect of simple precautions, such as careful cleansing of the baby's eyelids and knuckles, and scrupulous care about the first bath; in brief, the strictest attention to asepsis in the broadest sense of the word.

Of recent years, nothing of special importance has been published regarding the bacteriology of ophthalmia neonatorum. On the basis of 1,829 cases, partly personal and partly collected, I found [4] some years ago that the gonococcus was responsible for the malady in 64·56 per cent.—that is to say, in about two-thirds of the cases. Subsequent investigations by other workers have not invalidated the general truth of the estimate. For example, Wharton [5] found the gonococcus in 75 per cent. of the cases; Zade [6] in 64·17 per cent.; and Stadtfeldt [7] in 54·65 per cent.

The figures quoted refer mainly, if not exclusively, to patients of the hospital class. In trying to estimate how far they apply to other classes of the population, two points should be borne in mind: first, that many mild cases of ophthalmia are never brought to hospital; and, secondly, that the higher the social standing of the parents, the lower is likely to be the proportion of the gonococcal cases.

The discovery of the gonococcus in a given case depends upon several things, the most obvious of which are the bacteriological competence of the surgeon, the stage of the disease, and the method of treatment that has been adopted. With regard to the last point, Dorland Smith [8] has made the definite suggestion that vaseline (much used in the States in conjunctival infections) has accounted for his not infrequent failure to identify gonococci in cases of undoubted ophthalmia neonatorum. It does not appear to be widely known that gonococci may persist for long after the acute symptoms of

ophthalmia have subsided, although (as surmised by Roemer) they are then almost certainly innocuous. I have elsewhere [4] published cases in which the organisms could be demonstrated in smears taken 60 days after the disease had commenced. The disappearance of gonococci, again, need not coincide in point of time with that of the purulent secretion from the inflamed conjunctiva; this is well brought out by Groenouw's figures [9]:— Of 15 cases, the micro-organisms disappeared 2 to 7 days before the secretion ceased, while in 8 cases they persisted from 1 to 25 days after it.

To Hanford McKee,[10] of Montreal, we are indebted for a useful hint about the *technique* of looking for gonococci in difficult cases. The palpebral conjunctiva is gently stroked with an ear-curette, and the material obtained is spread over a cover-slide. The preparation is dried in air, fixed for ten minutes in 80 per cent. alcohol, and finally stained by the Giemsa method, old or new. By adopting this plan, I have sometimes succeeded in demonstrating gonococci which the more common stains had not disclosed.

The adequate investigation of films for gonococci should include, then, three routine methods of staining:—

1. Carbol-methylene blue, thionin, or Pappenheim's stain.
2. McKee's method with Giemsa.
3. Gram's method, with a counter-stain, as vesuvine.

It is now agreed, that the combination of purulent inflammation of the conjunctiva in a baby with Gram-negative diplococci in the discharge from the eye is characteristic of gonococcal ophthalmia neonatorum. To quote Roemer's significant words[11]:—"Clinical cases of blennorrhœa, in which diplococci resembling gonococci have been found, have always been proved by culture to be gonococcal."

There has been some little tendency, perhaps, to lay too much stress upon the confusion that may arise between the gonococcus, on the one hand, and the micrococcus catarrhalis, on the other. Admittedly, the morphological likeness between these two Gram-negative diplococci is close, but, then, the micrococcus catarrhalis does not cause purulent inflammation of the conjunctiva, and has yet to be described in association with ophthalmia neonatorum. Moreover, any possible confusion between the two organisms could be settled very readily by

inoculating an agar tube, or indeed any of the common media, with pus from the eye, since a growth of the micrococcus catarrhalis would be obtained, even at the room temperature. The last proviso is important, for although the gonococcus will not ordinarily grow upon agar, yet if enough pus is carried over from the inflamed eye, a growth of the organism may be obtained, but only at incubation temperature (37° C.).

A much more likely source of confusion would be with the meningococcus (Weichselbaum), if this had ever been known to occur in a case of ophthalmia neonatorum. The organism, however, has been found in conjunctivitis in older children by Fränkel, Hugland, Koplik, Dorland Smith, Gabrielides, L. S. Thomson, G. C. Robinson, and others. No mere examination of cover-glass preparations will serve to distintinguish the meningococcus from the gonococcus. The differential diagnosis calls for agglutination or fermentation tests.

Of recent years, some attention has been paid to the occurrence of so-called "chlamydozoa" in cases of ophthalmia neonatorum. These epithelial inclusions were originally described by v. Prowazek and Halberstaedter[12] in 1907, as present in cases of trachoma. They had enjoyed many opportunities of seeing this disease in Java, whither they had gone, in the *entourage* of Professor Neisser, for the purpose of studying syphilis experimentally in apes. They were named "trachoma-bodies," by Greeff, of Berlin, shortly after. These bodies were found (1909) by Heymann in four cases of gonococcal ophthalmia neonatorum, and by Lindner in cases of non-gonococcal ophthalmia.[1] Heymann also discovered the inclusions in the urethral epithelium of the mother of one of the babies with inclusion ophthalmia. Lindner set up inflammation by inoculating apes with secretion from cases in which these bodies had been demonstrated. The period of incubation was found to range from 4 to 11 days, and the inclusion bodies were present in the inoculated mucous membrane.

By the inoculation method, Lindner, Fritsch, and Hofstätter

[1] Stargardt was actually the first to describe the "chlamydozoa" in a case of ophthalmia neonatorum (*Versamml. d. Ophth. Ges.*, Heidelberg, 1908), and the observation was confirmed by Schmeichler.

were able to establish the existence of the inclusions, not only in the maternal parts, but also in a form of masculine urethritis. Heymann found them in the urethral secretion of a couple of men, as well as in the vaginal secretion of four females, whose babies had suffered from inclusion ophthalmia. Halberstaedter and v. Prowazek[13] re-opened their investigations into the subject, and reached the conclusion that there were forms of non-gonococcal ophthalmia in babies, in which the inclusions might be found. On the other hand, they failed to find them in cases, recent or of long standing, of gonorrhœa in men or women, neither could they demonstrate them in cases of gonococcal ophthalmia neonatorum. But they were discovered in preparations made from the orifice of the urethra in the mother of a baby with non-gonococcal ophthalmia. By Morax, Lindner, and Bollack,[14] these epithelial inclusions were detected in 9 of 13 cases of non-gonococcal ophthalmia.

The matter is still further complicated by the several facts, that McKee has found the inclusion bodies in the normal conjunctiva of two babies in a maternity institution; Flemming in the genito-urinary apparatus of man and animals; and Uhlenhuth in the conjunctiva of pigs in an early stage of hog-cholera. For the present, we must be content to leave this question in a very unsettled state.

The list of micro-organisms that may cause ophthalmia in the baby is a tolerably long one, although some of the microbes, such as the B. pyocyaneus, are seldom met with. If we take a broad general survey of the causative micro-organisms, we may say that of every 100 cases of ophthalmia neonatorum, 65 per cent. are due to gonococci, 10 per cent. to pneumococci, 5 per cent. to B. coli, and 5 per cent. to other organisms, of which perhaps the most important are the S. pyogenes and the Koch-Weeks's bacillus.

It will be noted that no fewer than 15 per cent. of our 100 cases are free from microbes, or at all events show only such banal organisms as the B. xerosis and the S. p. albus, which, in older subjects, may be regarded as normal, or almost normal, inhabitants of the conjunctival sac. How are we to account for these cases of amicrobic ophthalmia neonatorum? A proportion of them (as already explained) are associated with "chlamydozoa," although whether as cause and effect we do

not know for certain. A high authority, Morax,[15] has expressed the view that non-gonococcal ophthalmia in the infant is in the great majority of cases of the inclusion variety.

Some of the amicrobic cases, as surmised by Cramer,[16] may be due to injuries sustained by the conjunctiva, while the baby is still *in utero*. Damage during the act of birth, also, may play its part in weakening the resistance of the conjunctiva, thereby allowing saprophytes, such as those already mentioned, to take on pathogenic properties. The same effect may probably be induced by the employment of strong antiseptics, as silver nitrate, to the eye immediately after birth. The relatively large number of amicrobic cases met with at Queen Charlotte's Lying-In Hospital, London, is probably to be accounted for by the routine employment of silver to the baby's eyes before leaving the labour ward. They were certainly more common, years ago, when a stronger solution of silver was employed.

Many of the cases show, when examined with the microscope, a number of xerosis bacilli or white cocci far in excess of that usually found. It really seems as if these organisms, usually so harmless as regards the mucous membrane of the eye, may under certain circumstances assume toxic properties, when the conditions, local or general, are favourable; for such we must assume them to be in premature or feeble babies or in babies, whose natural defences have been impaired by injury, mechanical or chemical. An analogy is not far to seek. Post-operative inflammation of the conjunctiva is likely to be due to the same cause. It has also been suggested by more than one writer that the cause of the irido-cyclitis or endophthalmitis, liable to follow the extraction of cataract at an interval of time, is to be sought in the saprophytic organisms named, which are capable of taking on pathogenic powers when introduced at the time of operation into a suitable medium, such as that furnished by the aqueous humour when laden with remains of the crystalline lens.

Finally, I have elsewhere expressed the opinion that many of these cases of ophthalmia are to be regarded as premonitory or concomitant signs of congenital syphilis. Such cases are rather characteristic in one way, namely, that while the discharge is tolerably copious, the evidences of inflammation are relatively slight.

Of more importance than the particular kind of micro-

organism, is the general recognition of the basic principle that all the microbes associated with ophthalmia neonatorum have been found in the female genito-urinary passages and, for that matter, in the male urethra. In a sense, therefore, every case of ophthalmia may be traced in the ultimate analysis to the male urethra.

It is important to recall the fact that ophthalmia in the baby is always due to the transfer, direct or indirect, of infective material from the maternal passages. Nowadays, it is agreed that infection most commonly arises soon after the birth of the head, by the infant blinking into its conjunctival sac the infective material that clings about the eyelids and eyelashes, or by rubbing it in with its own knuckles. On the other hand, it has gradually become recognized that inoculation during passage of the head through the vagina is a rare event, although it may admittedly come about during face presentations, the application of forceps, or during digital exploration on the part of the midwife.

It has now become known that ante-partum infection is by no means the extremely rare event it was once believed to be. That "congenital ophthalmia" did occur was surmised from those rare cases in which babies born in a caul were found to suffer from the disease, or to develop it shortly after birth (Taylor, Barnes, and Neiden), or when a child with florid ophthalmia was delivered by Caesarian section (Cullingworth, Veit, Jardine, Terson). Indeed, that babies might come into the world with ophthalmia, or with its consequences, is a fact that has been known, although perhaps not generally recognized, for many years. The existence of such cases was mentioned by Quellmalz[17] as long ago as 1750. In 1902, Queirel,[18] a Marseilles obstetrician, whose work has apparently been overlooked by ophthalmic surgeons, reported 15 cases of the kind from his own practice. In the Middlemore Prize Essay for 1907, I was able to publish from the literature 71 cases of ante-partum ophthalmia, and to that number added 19 others met with in the course of my own work.

In explanation of these cases, it has been assumed that the liquor amnii has been discharged long enough before the completion of the second stage of labour to allow of the inoculation of the infant's eyes with gonococci, or other pathogenic

micro-organisms, present in the maternal passages. Assuming that the fluid was really liquor amnii, and not the liquid known to be sometimes present between amnion and chorion, this premature escape, as originally surmised by Haussmann, accounts for a proportion of the cases. It may actually have taken place in 26 of the 71 cases in which the time of rupture of the membranes was mentioned. But there still remain 63·38 per cent. of the cases included in my analysis, to which Haussmann's theory could not apply. Thanks to the work of Kühne, Haussmann, and recently of Hellendall,[19] there is now experimental evidence to show that penetration of the intact amnion by bacteria is possible.

It is known that micro-organisms, especially the gonococcus, may lurk in the recesses of the uterine mucosa as the result of a latent gonorrhœa, and it is probable that they may pass through the chorion and amnion, and thus reach the liquor amnii. They can then infect the baby's conjunctival sac during the last months of pregnancy; that is to say, when the eyelids are no longer adherent, as they are up to the end of the fifth month of gestation. What is true of the gonococcus, is true also of the other microbes associated with ophthalmia neonatorum, especially of the B. coli. The bacteriological permeability of the membranes once granted, organisms may obviously reach the uterine cavity either from the mother's anus or from the peritoneum by way of the Fallopian tubes.

The analogy of ante-partum ophthalmia with the condition in which the liquor amnii is found to be brownish in colour, muddy in consistence, and offensive in smell, is somewhat striking. H. Handfield-Jones[20] has published details of five such cases among 33,000 deliveries at the British Lying-In Hospital, London. In one case, the offensive fluid was found to include staphylococci and coliform bacilli. Handfield-Jones thinks that if infection with the coliform bacillus occurred after rupture of the membranes, then the putrefactive changes must have taken place with preternatural rapidity. In one of his cases, however, the amniotic fluid was noted to be muddy and offensive at the time the membranes ruptured. The two conditions, ante-partum ophthalmia and offensive liquor amnii, have been

known to co-exist, as in cases reported by Chavanne and Armaignac respectively.

Finally, it should be said that, from the bacteriological standpoint, ante-partum cases do not differ materially from the more ordinary type of ophthalmia neonatorum. Among my 19 cases of ante-partum ophthalmia, 52 per cent. were associated with gonococci, 10 per cent. with pneumococci, 5 per cent. with B. coli, and 5 per cent. with B. pyocyaneus, while in 26 per cent. no pathogenic organisms could be demonstrated.

When the baby's eyes have become infected in the ordinary way shortly after birth, the symptoms of ophthalmia are usually noted on the second, third, fourth, or fifth day. After the seventh day, the symptoms are much more likely to be the outcome of a secondary infection, due to transfer of the infected lochia from mother to child. These "secondary infections," which by no means always pursue the mild course that is often believed, form probably about 25 per cent. of all cases of ophthalmia neonatorum. It may be a difficult matter to trace the infection, even when gonococci are found abundantly in the discharge from the infant's eyes. There may have been, clinically, no reason whatever for suspecting gonorrhœa in the mother before labour, and the puerperium may be running a normal afebrile course. Bacteriological examination of the lochia not infrequently yields a negative result; yet, if carried out in the right way, gonococci can usually be found in the maternal passages. It is essential, however, to search for the organisms in material taken direct from the urethra or the cervix. The cases are, doubtless, to be explained by the presence of a "residual" or "latent gonorrhœa," of the existence of which the woman is probably ignorant. There is evidence to prove that these organisms may multiply during the puerperium, becoming presumably not only more numerous but more virulent as well.

In brief, an ophthalmia, that begins on the seventh day or later, is due to secondary infection; while one that commences within twenty-four hours of birth, is due not to an enhanced virulence of the causal germ, but to intra-uterine infection.

Just as our conception of gonorrhœa as a systemic affec-

tion has widened during recent years, so a similar evolution has taken place with regard to ophthalmia neonatorum. The complications are much the same in the one disease as in the other. The pioneer in this direction was Clement Lucas[21] of Guy's, who, in the early part of 1885 pointed out that the joints might become affected in babies suffering from ophthalmia, thus anticipating by a few months similar observations by the Swedish ophthalmologist, Johan Widmark.[22] Since Lucas wrote, many reports have been published in the medical journals of this and of other countries. By Deutschmann [23] and others, gonococci have been demonstrated not only in pus from the inflamed eyes, but also in fluid withdrawn from the joints by puncture. The arthritis usually attacks one or more of the larger joints, and seldom ends in suppuration. It subsides *pari passu* with the ophthalmia. It may be associated (as I believe I was the first to point out) with effusion into the sheaths of the neighbouring tendons.

Some of these cases of arthritis are to be looked upon as evidences of a generalized septicæmia. This may show itself in other ways, as by meningitis, endocarditis, pericarditis, pleuritis, and may end in death, as in cases reported by Widmark, Chartres, E. W. Stevens, and F. N. Lewis. On the other hand, as in a case of my own, sepsis may take a much milder form. The baby, who was affected with severe gonococcal ophthalmia, developed several abscesses, some in connection with bone, but made an excellent recovery when these had been treated surgically.

The list of complications of ophthalmia neonatorum is by no means exhausted. One of the more common is the so-called "parotid bubo," or, in other words, tenderness and tumefaction of the pre-auricular gland, which, in the event of secondary infection, may even suppurate. Some doubt has recently been thrown upon the gonorrhœal nature of the mild inflammations of the mucous membrane of the mouth, nose, external auditory meatus, and rectum, that may on occasion complicate ophthalmia, although gonococci have been described in such cases. The suggestion is that the micrococcus catarrhalis and not the gonococcus was present. A similar suggestion, curiously enough, has not been offered in explanation of the vulvo-vaginitis that in female babies is sometimes found

to complicate ophthalmia. I can vouch for it, personally, that gonococci are usually to be found in that condition.

Bergmeister recently exhibited, before the Vienna Ophthalmological Society, a baby, aged 4½ weeks, in whom bilateral ophthalmia had become complicated by gangrene of the outer canthus of each eye. The discharge from the conjunctiva included both gonococci and streptococci. The case appears to be unique, although instances have been known in which gangrene of the skin of the eyelids has followed the treatment of ophthalmia by ice. Infection of the anterior ethmoid cells, manifesting itself clinically as an orbital cellulitis, has been reported by G. F. Suker[24] as a complication of ophthalmia, and cases have been noted by more than one writer of abscesses about the eyelids.

It does not appear to be generally known that various skin lesions may result from inoculation with the gonococcus during birth. Particular attention has been called to these conditions by Paulsen.[25] I have met with a couple of cases of this sort in conjunction with ophthalmia neonatorum. The diagnosis can be made only by finding the specific micro-organism in the cutaneous lesion.

A very curious complication is furnished by mammary abscess in a mother who was nursing an ophthalmic baby (Legay, Cataliotti). In Sinclair's case[26] gonococci seem to have been found in the pus from both the mother's breast and the baby's eye. In another singular case by Schoeler,[27] infection of an injured finger with pus from a baby's eye caused necrosis, abscess, and death from sepsis. Smears from pus obtained from the infected wound showed the presence of gonococci.

Not much that is new can be said with regard to the curative treatment of ophthalmia neonatorum. The basic principle remains, namely, the removal of every trace of pus as soon as it is formed. The stagnation of pus must be avoided at all hazards, because to allow this to take place is to endanger the structural integrity of the cornea. In a severe case, and during the height of the disease, this implies the services of a day and a night nurse. Some municipalities will provide nurses gratuitously for the purpose, under the direction of the Medical Officer of Health. Unless

the necessary attention can be given in the parents' home, treatment is best carried out in hospital.

At Liverpool, an admirable scheme has been organized by Mr. A. Nimmo Walker, whereby puerperal mother and ophthalmic baby are admitted to the wards of St. Paul's Eye Hospital, and kept there until the infant's eyes are out of danger. Prompt notice of the case is obtained by adoption of the *Notification of Births Act* (1907), combined with a system of visiting nurses under the control of the Corporation. Mother and child are removed to the hospital in a municipal ambulance. It is most satisfactory to note that no harm has been known to accrue to the mother, although the scheme has been working for upwards of six years. It should be mentioned that much the same sort of thing is done in Paris, and in some American cities, as Philadelphia.

The agents employed for ridding the baby's eyes from discharge are in the nature of weak antiseptics. In this country, the favourites are boric acid (saturated solution), potassium or calcium permanganate (1 : 5,000), or corrosive sublimate (1 : 10,000), while on the Continent mercury oxycyanide (1 : 4,000) enjoys a great reputation. Speaking for myself, I have, rightly or wrongly, formed the opinion that more harm than good is likely to be done with antiseptic lotions, and so, for my own part, I seldom employ anything to the infant's eyes more drastic than saline lotion 1·4 per cent. This is applied at body temperature by means of pledgets of absorbent cotton, or by a protected "Undine."

In addition to the utmost cleanliness, I use some remedy capable, if not of actually killing the gonococcus, at least of inhibiting its further development. My routine practice is to drop argyrol, 25 per cent., freely into the eyes every few hours, or less often according to the severity of the case. Only in cases that refuse to yield to less drastic measures do I employ silver nitrate, 1 per cent. or 2 per cent., painted over the everted conjunctiva once in the 24 hours.

Basic aluminium acetate, supplied under the trade name of "Lenicet," has been employed by Wolffberg[28] in ophthalmia neonatorum, and is stated by him to have a great influence in reducing the purulent discharge. It is used as a 10 per cent.

ointment made with euvaseline. Considerable doubt has been cast upon the utility of "Lenicet" by Spiro, Bayer, and Kümmell. On the other hand, Schoeler[29] speaks well of it when rubbed into the conjunctival sac at night.

The secretion of pus from the eye may be remarkably influenced by the vaccine prepared by the Pasteur Institute of Tunis, and described before the French Academy of Science on October 6th, 1913. This anti-gonococcic vaccine is injected into the gluteal region of babies or the veins of older subjects. It is both stable and atoxic, and in this country can be obtained from Messrs. Allen & Hanburys, Vere Street, London, W.

Nicolle[30] has obtained striking results in 24 cases of gonococcal ophthalmia with the new product. Cuénod and Penet[31] found that improvement, sometimes of a remarkable nature, usually followed the second injection of the vaccine, practised two or three days after the first. Slight and transient reaction followed its injection in babies. Offret,[32] who treated 15 cases of ophthalmia neonatorum with the novel vaccine, found that it almost always reduced the inflammatory symptoms and diminished the secretion, rendering the latter clear and mucous in place of thick and purulent. In two of Offret's cases, however, corneal ulcers developed while the patient was under vaccine treatment, despite diminution of the discharge and swelling of the eyelids. Offret, as the outcome of his experiences, concluded that this valuable therapeutic agent should be used in conjunction with irrigation and preparations of silver.

Another most useful remedy is pure liquid paraffin, with which the conjunctival sac may be filled in the intervals between the saline irrigations. I have been impressed with the action of this simple medicament, since it occurred to me a few months ago to employ it in the treatment of ophthalmia neonatorum.

The treatment of corneal complications, especially those met with early in the course of the disease, opens up large and important questions. The routine treatment is to continue the treatment of the ophthalmia, and at the same time to employ a solution of atropine sulphate, 2 to 4 grains to the ounce, dropped into the eye several times a day. Again and

again have I seen eyes go from bad to worse, when treated in this somewhat perfunctory way. As an everyday treatment I prefer physostigmine (eserine), grs. 2 to the ounce, used two or three times a day. If matters do not speedily improve, then, in my personal experience, the best plan is to use the cautery to the affected parts without further delay. In a milder type of case, I have seen tincture of iodine do good, when applied directly to the corneal lesion.

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