Ophthalmia neonatorum : its etiology and prevention / by Sydney Stephenson.

OPHTHALMIA NEONATORUM,

ITS ETIOLOGY AND PREVENTION

BY

SYDNEY STEPHENSON, M.B. C.M.

Read July 1st, 1903

[*From Volume XLV of the 'Transactions of the Obstetrical Society of London.'*]

PRINTED BY ADLARD AND SON
LONDON AND DORKING

1903

OPHTHALMIA NEONATORUM, ITS ETIOLOGY AND PREVENTION.

By Sydney Stephenson, M.B., C.M.,
OPHTHALMIC SURGEON TO QUEEN CHARLOTTE'S HOSPITAL.

(Introduced by Dr. W. S. A. Griffith.)

(Received April 1st, 1903.)

In the opinion of those well qualified to judge, ophthalmia neonatorum is the cause of more blindness than any other local disease, excepting perhaps atrophy of the optic nerve. Magnus estimated that in Germany it accounted for upwards of 10 per cent. of his 2528 cases of blindness, a result substantially confirmed by Trousseau in France, by Schaefer in Russia, and by Oppenheimer in America. The Royal Commission on the Blind, the Deaf, and the Dumb (which reported in 1889) estimated that about 7000 persons in the United Kingdom had lost their sight from the disease. This number of disabled people may be taken to represent an annual burden upon the commonwealth of £350,000, or upwards of one-third of a million pounds sterling.

It has been proved to demonstration that in ninety-nine cases out of a hundred ophthalmia neonatorum is preventable; and that it may be prevented, moreover, by the use of a few simple precautions.

It would be a mere truism to say that the term "ophthalmia neonatorum" is applied generally to every inflammation of the conjunctiva in a newly-born baby. But there is ophthalmia and ophthalmia. Some of the forms are harmless, or nearly so, whereas others are grave enough to account for a large percentage of blindness. As regards the serious class, it may be stated that they are almost invariably due to the specific microbe of gonorrhœa, while the others are associated with microbes of several different kinds.

Our first point of inquiry, accordingly, may be directed towards ascertaining in what proportion of cases the gonococcus can be demonstrated.

Name.	Reference.	Cases.	Percentage with gonococci.
Kroner	Vers. Deut. Aerzt., 1844 . .	92	68·47
Haab	Corr. f. Sch. Aer., 1885 . .	16	87·50
Widmark	Hygeia, 1885	25	76·00
v. Ammon	Münch. med. Woch., 1900 . .	100	56·00
Guerola	Ann. de Oftal., 1900 . . .	25	100·00
Neisser	Zeits. f. Aüg., June, 1901 . .	92	68·47
Andrews	New York Medical Journal, 1890 .	122	100·00
Hirschberg	Central. f. prak. Aug., p. 396, 1898	32	100·00
Kopfstein	Wien. med. Woch., 1891 . .	51	58·82
Francisco	New York Eye and Ear Infirmary Reports, Jan., 1895	40	75·00
Chartres	Rev. générale d'Ophtalmologie, 1891, p. 351	100	44·00
Gonin	Rev. Méd. de la Suisse Rom., 1899	38	58·00
Thomin	Thèse de Paris, 1901, p. 32 . .	20	70·00
Reyling	American Journal of Ophthalmology, Oct., 1897	14	71·42
Cohn	Collective Investigation, Berlin, 1896, p. 34	553	52·98
Groenouw	Bericht. d. Ophthalm. Ges. in Heidelberg, 1898	40	35·00
Alt	American Journ. of Ophthalmology, April, 1901	17	52·94

The foregoing table shows that in the practice of seventeen observers, gonococci were found in 61·68 per cent. of the 1377 cases. The proportion ranged from a minimum of 35 per cent. to a maximum of 100 per cent. The differences thus brought to light are somewhat striking, a fact that may be accounted for in several ways, of which, perhaps, the most important are (1) the social class of the patients, (2) the methods of bacterioscopic diagnosis, and (3) whether the disease had been treated or not before the discharges were examined for gonococci.

Amongst 76 cases of ophthalmia neonatorum recently investigated by me, gonococci were found in 41, or 53·94 per cent. Adding to the foregoing the figures I published a few years back on this subject ('Ophthalmia

in Newly-born Children,' 1898), it will be found that of my 121 cases of ophthalmia neonatorum, gonococci were demonstrated in 71—that is, in 58·67 per cent.

The total number of cases at our disposal, then, is 1498, and gonococci were present in 60·17 per cent. As the numbers dealt with are tolerably large, we shall scarcely err if we assume that about two-thirds of all cases of ophthalmia in newly-born babies are due to the micrococcus of gonorrhœa. The practical importance of this generalisation lies in the fact that in ophthalmia the cornea seldom suffers unless gonococci be the cause of the conjunctival inflammation.

The other micro-organisms that have been found in ophthalmia neonatorum are the following, named in the order of their relative frequency:—(1) the pneumococcus; (2) the Koch-Weeks bacillus;* (3) the diplobacillus of Morax-Axenfeld; (4) the *Bacterium coli*; (5) the Klebs-Loeffler bacillus; (6) the pneumobacillus; (7) common pyococci; (8) streptococci; and (9) *Micrococcus luteus*.

It will be apparent, therefore, that a first necessity in the more exact diagnosis of ophthalmia neonatorum is the bacteriological examination of the secretion from the conjunctiva. In my opinion, no figures of so-called "purulent ophthalmia" should now be accepted unless this obvious precaution has been taken. It is true that, after some practical experience, there is not much difficulty about identifying most cases of true gonorrhœal ophthalmia, but the diagnosis can never be said to rest upon a certain and scientific basis unless gonococci are actually demonstrated. There are, indeed, cases when the signs are so slight that nobody from a casual examination would suspect that gonococci lay at the root of the mischief, and no amount of mere clinical experience will enable one to identify such

* Under this head is included the micro-organism described by Dr. Zur Nedden ('Klin. Monatsbl. f. Augen.,' 1900, p. 173) as the "pseudo-influenza bacillus," and found by him in a case of ophthalmia neonatorum. To judge from Nedden's description, this is identical with the Koch-Weeks bacillus.

cases with even a tolerable approach to certainty. The following is such a case recently met with at the North-Eastern Hospital for Children:—William B—, aged 19 days, was brought on February 26th, 1902, with his right eye inflamed. He was the first child, and was born at term after a natural labour. His eye became inflamed on the seventh day, so that we clearly had to do with an instance of "secondary infection." It showed a little yellowish-white discharge; the lids were neither swollen nor reddened; the eye could be well opened by the baby; the cornea was clear; and the tear-passages were apparently normal. A note was made at the time to the effect that the case did not resemble the gonorrhœal form of ophthalmia. Nevertheless, by means of cover-glass preparations, gonococci were found to be tolerably numerous in discharge from the eye. I could quote several similar cases.

The difficulty of diagnosis is certainly not lessened by the existence of so-called "abortive" cases of gonorrhœal ophthalmia, of which a good instance has lately been reported by Dr. E. Ammann ('Klin. Monatsblätter f. Augenheilkunde,' xxxv, 1897, p. 307). In that case the infant, when seen on the fifth day after birth, showed a trivial conjunctivitis, the symptoms of which were stated to have existed from birth. It was associated with gonococci. The usual treatment was prescribed, and on the following day the secretion had much diminished, and it disappeared, along with the other signs of inflammation, in a very short time.

On the other hand, what looks clinically like a case of gonorrhœal ophthalmia sometimes proves, on bacteriological investigation, to be associated not with Neisser's coccus, but with some other micro-organism, especially with the pneumococcus or the *Bacterium coli*. There is no need to occupy time by quoting cases in support of this statement.

It may be fairly concluded from what has been said that gonorrhœal ophthalmia cannot be diagnosed in the absence of a bacteriological examination of the discharge from the eye, a point in which it resembles gonorrhœa itself.

In my experience, the bacteriological diagnosis of gonococci offers no particular difficulties as regards secretion from the conjunctiva, whatever it may do in other parts of the body. I can hardly help thinking that there has been a little tendency to exaggeration in some quarters as to the difficulty of the differential diagnosis of these micro-organisms. The intra-cellular groups of *numerous* biscuit-shaped diplococci, which are readily decolourised by Gram, but which retain the basic aniline dyes with some tenacity, are very characteristic. The double staining with pyronin and methyl green (Pappenheim) also yields excellent results. Indeed, cultures would not be necessary were it not for the fact that Hugland ('Klin. Monatsbl. f. Augenheilk.,' 1900, Beilageheft, p. 72) has recently described a case of severe purulent ophthalmia in a boy of five months, in the pus from whose eyes he found intra-cellular diplococci, which by means of cultures were shown to be the *Diplococcus intracellularis meningitidis* of Weichselbaum and Jaeger. Moreover, it is possible, although the author denies the fact, that the same microbe was observed by Krukenburg ('Klin. Monatsbl. f. Augen.,' 1899, p. 271) in conjunctivitis, and called by him the "pseudo-gonococcus."* Hence, in order to differentiate between the two microbes—the gonococcus and the meningococcus—it appears that we must inoculate agar-agar and incubate the tubes, when the former organism will not grow, while the latter will yield an abundant whitish cultivation. It must, however, be added that, so far as I am aware, the *Diplococcus meningitidis* has not yet been found in the ophthalmia of newly-born babies.

The ophthalmia produced by organisms other than the gonococcus, generally speaking, agrees in the following points:—it is milder, has a shorter duration, and, except when due to the Klebs-Loeffler bacillus, seldom affects the cornea. Thus, of thirty-eight of my gonorrhœal cases,

* C. Fränkel ('Zeitschrift f. Hygiene u. Infectionskrankheiten,' 1899, Band xxxi) described in the same year three cases of pseudo-membranous conjunctivitis in children associated with the meningococcus.

exactly 50 per cent. showed corneal damage; while of thirty-nine non-gonorrhœal cases, the cornea was affected only in 17·94 per cent. Some of the latter were almost certainly gonorrhœal, but as they did not come under treatment until very late in the disease, gonococci could not be demonstrated.

Many investigations have been made into the bacteriology of the normal conjunctival sac; but, curiously enough, no little difference of opinion still exists with regard to the subject. One school, represented by Arnold Lawson, Franke, and Jameson, holds that the healthy conjunctiva is often relatively sterile; whereas a second school, of which Morax, Randolph, and Gifford are the chief exponents, believes that such organisms as the *B. xerosis*, the *S. p. albus*, and the *S. epidermidis albus* are practically always present, although perhaps in an attenuated state. So far as I am aware, the conjunctival sac of the newly-born baby has not yet been investigated bacteriologically. This fact induced Dr. A. W. Sikes, pathologist to Queen Charlotte's Hospital, and myself to carry out a series of investigations upon the eyes of newly-born babies immediately after the cord had been cut, and before the eyes had been touched in any way. In twenty babies thus examined, the culture tubes were found to be sterile in fifteen instances, while in the other five sarcina aurantiaca, flava, and alba, and a yeast-like oidium albicans, were found. It is important to notice that in no single instance was a pathogenic micro-organism demonstrated.

Vaginal discharges appear to be common accompaniments of pregnancy, especially in the lower classes. Investigations made by Cederschold ('Medical Gazette,' 1840, p. 382) so long ago as the year 1832 went to show that genital discharges existed in 137 out of 328 pregnant women. Haussmann ('Die Bindehaut-Infection der Neugeborenen,' 1882) found purulent or mucous secretions in 249 of 250 pregnant women! Oppenheimer ('Arch. f. Gynäk.,' xxv, 1885), amongst 108 inmates of the Heidelberg Maternity Hospital, discovered gonococci in 27 per cent.

Dr. G. G. van Schaick ('New York Med. Journ.,' 1897, p. 598) has recently drawn attention to the frequency of gonococci in married women suffering from leucorrhœa. He examined bacteriologically scrapings from the vaginal rugæ and neighbouring parts in 65 women, and found gonococci in 26 per cent. It is important to note that these women were all of fair social status, and that no female whose position "made her infection a professional perquisite was knowingly included in the list." It is a somewhat curious fact that, from all I can hear, the experience of Queen Charlotte's Hospital is at variance with the above statements. It would be interesting to know whether this is the general experience of the London lying-in institutions.

Now the actual infection of the baby's eyes with gonococci may come about in three possible positions: (1) in the maternal passages either before or during the act of birth; (2) almost immediately after birth; and (3) one or several days after birth.

All the evidence at our disposal points to the second as by far the commonest mode of infection. The germ-laden discharge from the maternal passages clings about the eyelids and eyelashes, and, as a rule, is carried into the conjunctival sac either by the blinking of the baby or by the water, sponges, or towels used for the first bath. This mode of infection is spoken of as "primary."

This being so, it becomes easy to understand that the disease, in most cases, makes its appearance within three days of birth, as shown in the following table:

	Cases.	1—4 days.	4—8 days.	After 8 days.
Uppenkamp . .	328	58·84	35·97	3·35
von V. Hecker . .	100	54·00	46·00	—
R. Köstlin . . .	15	53·33	26·66	13·33
E. T. Collins . .	32	78·13	12·50	9·37

In respect of this table, it should be noted (*a*) that all kinds of infections, primary and secondary, are grouped together; and (*b*) that no attempt has been made to distinguish between gonorrhœal and non-gonorrhœal cases. It is improbable that a gonorrhœal infection contracted soon after birth would manifest itself later than the fourth day, and the table shows that roughly two-thirds of all cases appeared within that period. Cases occurring after that time, if gonorrhœal, are "secondary" inoculations, as from the articles used in the lying-in room, or from the fingers of the mother or attendants, or are caused by micro-organisms other than the gonococcus. A table is appended of my own cases in which the gonorrhœal are distinguished from the non-gonorrhœal cases:

	Cases.	1—4 days.	4—8 days.	After 8 days.
Gonorrhœal . .	41	80·48	7·31	12·19
Non-gonorrhœal .	35	57·14	37·14	5·77

The mode of infection first mentioned—namely, that within the maternal passages—must be assumed to have occurred when a baby is actually born with ophthalmia or develops symptoms of the malady within a few hours after birth. A child, as well known, normally traverses the vagina with closed eyelids, and, as the junction between the lids is watertight, morbid secretion can hardly enter the conjunctival sac under ordinary circumstances. That could, however, readily come about during face presentations, the application of forceps, or by digital examinations on the part of the accoucheur. Some of the cases of ante-partum infection can be explained by a rupture of the membranes having taken place several hours or even days before the child was born, thereby allowing gonococci to reach the conjunctival sinuses. The temperature of the parts may possibly account for the relatively rapid development of the inflammatory process. Magnus ('Klin.

Monatsbl. f. Augen.,' 1887, p. 385) and Bellouard ('Thèse de Paris,' 1892) have each reported instances of this kind. Parichew ('Annales d'Oculistique,' t. cix, 1893, p. 313) has related a case in point, where an ill-nourished baby, as soon as it was born, was found to be suffering from ophthalmia, associated with opacity of the cornea. Gonococci were demonstrated in secretion from the eyes. The membranes, according to Parichew, had ruptured three days before the beginning of the labour, which lasted about 12½ hours and was normal in every way. The following is a brief account of one of my own cases :—Thos. W—, aged three weeks, was seen on February 23rd, 1898, suffering from bilateral ophthalmia, with gonococci. The baby was born at term after a labour lasting 26½ hours, and the "waters burst" certainly twenty hours before the completion of the labour. The right eye was observed to be inflamed as soon as the child came into the world, and the left eye became infected on the tenth day. I have seen a few similar cases.

It is, however, probable that there is another means whereby the eye becomes infected *in utero*—namely, by the passage of gonococci through the intact membranes. The first authentic case of this kind known to me was reported in 1858 by Rivaud-Landrau, of Lyons, and since then cases have been published by Chancon, Strzeminski, and Armaignac. Armaignac's case ('Annales d'Oculistique,' October, 1902) was so well reported as to deserve a word of passing description. An ill-developed infant, weighing only 1786 grammes, was born at the eighth month, after a labour lasting 1½ hours. The membranes were ruptured by the midwife ¾ hour before the expulsion of the fœtus. At birth the eyelids were found to be red and swollen, and on separating them pus escaped from the eyes. A purulent vulvitis was also present. The mother had borne one child 2½ years before, and that child had remained free from ophthalmia. During her second pregnancy, however, the mother had suffered from metritis. One must therefore admit that so-called "con-

genital ophthalmia neonatorum" does occur, although very rarely. Nieden's case ('Klin. Monatsbl. f. Augen.,' October, 1891), where a baby, born in a caul, developed ophthalmia twenty-four hours later, doubtless belongs to this class. Under the above circumstances we must, I suppose, assume the existence of a specific endometritis, with the passage (direct or indirect) of gonococci into the amniotic fluid, although that is a possibility upon which it would be most interesting to hear the expert views of members of the Society. Finally, Dr. Mules ('Essay on Ophthalmia Neonatorum,' 1888) has claimed that during the passage of the fœtal head through the external orifice, specific muco-pus may be introduced directly into the eyes by a mechanical action of the tightly-stretched edge of the perineum. This interesting fact (which Mules has himself seen) need not detain us, inasmuch as for present purposes such cases may well be classed with those where infection occurs shortly after birth.

The recognition of the connection between leucorrhœa in the mother and ophthalmia in the baby certainly dates back to 1750, when Quellmatz ('Centralbl. f. prakt. Augenheilkunde,' February, 1894) insisted upon the point. The fact was mentioned by Goetz in 1791, and by Selle in 1793. It is, however, gratifying to note that to an Englishman, Dr. Benjamin Gibson of Manchester, who wrote in 1807 ('Edinburgh Medical and Surgical Journal,' p. 159), we owe the first clearly reasoned description of the rational means of preventing ophthalmia neonatorum. I cannot refrain from quoting the exact words, which are as follows:—"First, to remove, if possible, the disease in the mother during pregnancy; 2nd, if that cannot be accomplished, to remove artificially as much of the discharge as possible from the vagina at the time of delivery; and 3rd, to pay, at all events, particular attention to the eyes of the child by washing them immediately after delivery with a liquid calculated to remove the offending matter or to prevent its noxious action." A few years after the appearance of this article, Dr. John Vetch ('Practical

Treatise on the Diseases of the Eye,' 1820, p. 242) furnished the experimental proof of the truth of Gibson's deduction by inoculating the urethra with ophthalmic pus, and thereby inducing gonorrhœa within thirty-six hours.

To Credé, however, undoubtedly attaches the credit of having devised the most practical means of preventing ophthalmia neonatorum. This was by the application of a single drop of a 2 per cent. solution of silver nitrate simply dropped into the baby's eyes as soon as possible after birth. Writing in the year 1881, Credé explains that during some seven years before the adoption of his plan no less than 10 per cent., in round numbers, of the 2266 babies born in the Leipzig Maternity Hospital developed ophthalmia. After the systematic use of the silver solution one child only amongst 1160 was attacked,—that is, ·086 per cent. As Dr. J. Watt Black, a former President of the Society, has justly said, when discussing this question a few years ago, "Except the introduction of vaccination by Jenner, nothing greater has ever been done for the prevention of blindness in children" ('Obstetrical Transactions,' vol. xxv, 1894), a sentiment with which I am in complete accord.

Credé's epoch-making experiences have been repeated, extended, and confirmed in every quarter of the civilised world. Medical literature contains many striking testimonies to the success of his plan. Thus in 1895 a most instructive paper on the value of the method was published by Dr. R. Köstlin, of Halle ('Archiv f. Gynäkologie,' 1895, Zweites Heft, p. 257). Köstlin showed that prior to the introduction of the method the amount of ophthalmia ranged from 3 per cent. to 50 per cent. in the practice of thirty-eight observers, and averaged 9·24 per cent. in the returns from thirteen observers who gave the necessary figures. After the employment of Credé's plan amongst 24,724 babies, the percentage of ophthalmia sank to 0·665. Could any figures be more conclusive as to the value of the method?

Many attempts have been made to replace silver nitrate

by other agents, antiseptic and otherwise. The long list includes carbolic acid, sublimate, sterile water, iodoform, protargol, aniodol, iodine trichloride, to name only a few of the number. Each and all of the foregoing agents, with the possible exception of corrosive sublimate and protargol, have proved themselves inferior to the 2 per cent. silver recommended by Credé. A glance at the following figures, modified from Köstlin's tables by Dr. Lucien Howe ('American Journal of Ophthalmology,' xiv, 1897, p. 232) and myself, will render this obvious :

Agent.	Births.	Ophthalmia.
1. Silver nitrate, 1 per cent.	1223	2·4
2. Carbolic acid solutions	1623	7·7
3. Sublimate, 1 per cent.	965	0·6
4. Sterile water	5823	3·12
5. Iodine trichloride solutions	701	1·2
6. Protargol, 20 per cent.	2100	0·28
7. Aniodol, 1 in 4000	940	0·74

Although objections have been raised to anything like a general adoption of Credé's method, yet these have usually been of so vague a character that it is impossible to examine them seriously, let alone to refute them. On the other hand, of 110 medical men who replied to a circular letter on ophthalmia neonatorum issued by Professor Hermann Cohn, of Breslau, in 1896, fifteen only were opposed to the general introduction of the Credé method ('Ueber Verbreitung u. Verhütung der Augeneiterung der Neugeborenen,' Berlin, 1896). Of the dissentients, one alone (Dr. Wilbrand, of Hamburg) was able to bring forward any definite objection in the shape of consecutive corneal opacities.

Nevertheless a few tangible objections have been mentioned by various writers. They are three in number, viz. (1) conjunctival catarrh, (2) conjunctival hæmorrhage, and (3) corneal opacities or ulcerations. It will not be a waste of time to examine these points one by one.

(1) That the use of 2 per cent. solution of silver nitrate

is often, perhaps always, followed by a discharge from the eyes, and in rarer instances by a certain amount of hyperæmia, will be disputed by nobody who has had practical experience of the method. Cramer's observations ('Centralbl. f. Gynäkologie,' 1899) bear out this statement. He found an appreciable reaction in no less than 96 per cent. of his hundred cases. This, he thinks, is closely connected with the development of the baby, and to some extent upon the mode of birth. Cramer believes that in a large number of instances the silver sets up inflammation of the conjunctiva and entails incurable sequelæ. It must, however, be pointed out that Cramer did not adhere strictly to Credé's method, but, in order to secure a full distribution of the solution, opened and closed the baby's eyelids with his forefinger a number of times. This makes it possible that traumatism had something to do with his bad results.

In order to ascertain the facts, Drs. Brehaut and Worthington, of Queen Charlotte's Hospital, have recently, at my suggestion, made a series of observations upon babies in whom Credé's method had been employed shortly after birth. The results were as follows:—Between January 5th and January 21st, 1903, fifty consecutive babies were closely observed, and in all, except possibly one, there was some reaction after the use of the silver drops. This took the form of a watery mucous discharge from the eyes, unaccompanied by any appreciable redness of the ocular or palpebral conjunctiva. In a few instances discharge from the eyes was noted within one hour of the application, but usually it was not observed until three hours had elapsed. It persisted from four hours to 2½ days.

Zweifel ('Centralbl. f. Gynäkologie,' 1900, No. 51) has lately conducted some suggestive experiments to ascertain the cause of the catarrh that so frequently follows Credé's method. In 816 newly-born babies that observer washed one eye with distilled water before applying the silver, while, after the silver had been applied, he irrigated the

other eye with a dilute solution of sodium chloride. Zweifel found that catarrh developed in the first, but not in the second case. He therefore thinks that catarrh may be due to the absence of the saline tears from the newly-born child, and, logically enough on this view, advises that the silver employed in the Credé plan should be afterwards neutralised by means of a solution of salt.*

So far as I can gather, there is no evidence to show that the application of 2 per cent. silver can cause an actual inflammation of the conjunctiva. *Post hoc* is not always *propter hoc*. At most, it may predispose to such inflammation by reducing the resisting powers of the parts, so that common micro-organisms, usually non-pathogenic as regards the conjunctiva, may assume infective powers. This view is borne out by the undoubted fact that in many mild catarrhs of newly-born babies where the silver has been used, nothing can be found in the conjunctival secretion beyond the *S. p. albus* and the ubiquitous xerosis bacillus, which some authorities think to be normal or almost normal inhabitants of many healthy eyes.

(2) It is a rather curious coincidence that several cases have been reported where persistent bleeding from the conjunctiva has followed the use of silver drops. For example, A. J. Abbe ('Annals of Ophthalmology,' 1899, p. 10) mentions such a case in a baby born at term, but weighing only 5 lbs. Some twelve hours after birth, owing to existence of discharge from one eye, a drop of a 6 per cent. solution of silver nitrate was used, but "before this was done," to quote the author's words, "the lid of the right eye had begun to look red and swollen." Shortly after the application, blood commenced to trickle from one eye, and this was soon followed by bleeding from the other eye. Despite treatment, the baby succumbed about two days after the bleeding was first noticed. In de Schweinitz's case ('Medical Record,' April 18th,

* Experiments are now being undertaken at Queen Charlotte's Hospital in order to control Zweifel's results (August, 1903).

1891) a 2 per cent., and then three hours later a 4 per cent. silver solution was applied to the eyes. Twelve hours afterwards, bleeding from the conjunctiva set in, and persisted for about two days. The baby recovered. With regard to the cases mentioned, it is clear that in neither can the hæmorrhage be charged against Credé's method, in which a single drop of a 2 per cent. solution is used.

In a case recorded by Pomeroy ('New York Medical Record,' August 20th, 1897) Credé's method appears to have been adopted one day after birth, and was followed by a slow oozing of blood from the conjunctiva. The baby died. In this connection it may be noted that bleeding from the conjunctiva has been seen by several authors in babies suffering or convalescent from ophthalmia neonatorum. Hansell ('Ophthalmic Record,' February, 1901) described such a case in a child born at the seventh month and weighing 3 lbs. 3½ oz. Nettleship ('Diseases of the Eye,' 1897) met with a similar condition Oetlinger (Michel's 'Jahresbericht,' 1900, p. 498) mentions the case of an undersized baby in whom, on the thirteenth day after birth, bleeding occurred from the conjunctiva of one eye, and was followed next day by hæmorrhage from the skin. Death took place in six days, and the autopsy revealed hæmorrhages into internal organs.

Indeed, it may fairly be asked whether there is any causal connection between the use of silver drops, on the one hand, and conjunctival bleeding, on the other. In trying to decide this question we must remember that many newly-born children are predisposed to hæmorrhage, as witness those not altogether uncommon conditions epistaxis, cephalhæmatoma, sterno-mastoid ecchymosis, melæna neonatorum, omphalorrhagia, and visceral hæmorrhages. In some babies, again, aside from any definite anatomical lesion, there is a great tendency to spontaneous bleeding. Although rare, this so-called "idiopathic hæmorrhage" (which appears to be distinct from hæmophilia) is well known to those who have much to do with very young children. It has been estimated that death

occurs in 60 per cent. of the cases, and the condition in some instances is almost certainly connected with congenital syphilis. Cases of this kind may have been recorded where hæmorrhage occurred from the conjunctiva apart from any use of silver drops. Thus, Koudiche ('Revue générale d'Ophtalmologie,' 1898, p. 35) reported such a case in a baby one day old which proved fatal. It is quite likely that Pomeroy's case (the only one in question) belonged in reality to that class.

(3) It is alleged that corneal opacities may follow the use of the Credé method. Few of the recorded observations with regard to this point will bear any critical examination. Wilbrand's two cases have been mentioned before, but in neither could it be ascertained, despite Professor Cohn's careful inquiries into the facts, (*a*) how the method was carried out, nor (*b*) the actual strength of the solution employed. I must leave you to judge what credence must be attached to loose statements of this kind. Van de Bergh ('Presse Médicale Belge,' October 13th, 1895) reports a case where the energetic use of sublimate and afterwards of 2 per cent. nitrate of silver was followed within twenty-four hours by an opacity of one cornea. Credé, however, never recommended so drastic a measure of prophylaxis. Romiée ('Le Scalpel,' February 2nd, 1896) quotes cases where a fibrinous conjunctivitis and corneal opacities followed the employment of the Credé method, but his statements are open to a similar kind of criticism.

Against these inconclusive statements we may put the fact that amongst 30,000 babies treated by Credé's method by Dr. W. Leopold ('Berl. klin. Woch.,' No. 33, 1892) an unfavourable reaction was never observed. The same remark applies to the 24,723 babies tabulated by Dr. R. Köstlin. It may be taken for certain, as Dr. Lucien Howe has shrewdly pointed out, that if a bad result could be traced to the Credé method, the fact would be accorded a wide publicity.

Two other objections have been raised to anything like

the general adoption of the Credé method : (1) that it is too complicated to be entrusted to the average midwife ; and (2) that it does not always prevent the development of ophthalmia.

(1) That the ordinary midwife is too unintelligent to apply the method correctly can scarcely be admitted as a serious argument. She is often compelled, for instance, to undertake things that require at least as much intelligence as applying a drop of liquid to a baby's eyes, such as tying the cord, or giving a vaginal douche. Michaelsen's case ('Centralblatt f. p. Augenheilkunde,' 1900, p. 63), where a midwife, having run out of the 2 per cent. solution, hastily sent to the nearest chemist and obtained a solution of 20 per cent. silver, which she dropped into the eyes of two babies, with consequences which may be better imagined than described, must surely constitute a unique instance of carelessness on the part either of the chemist or the nurse. It is, however, no argument against Credé's method. Nevertheless, stress has been laid upon this objection by several writers.

(2) Does Credé's method always prevent the development of ophthalmia neonatorum? The answer to this question must be in the negative. In response to Cohn's oft-quoted circular, replies were received from thirteen medical men, who had met with no fewer than 36 cases of blennorrhœa amongst 310 births,—that is to say, in 12 per cent. This seems a startling result, but a moment's reflection will show us that the percentage ought to be calculated not from the results of thirteen returns only, but from the whole number replying to the circular. Then there remains the fundamental fact—namely, that amongst the 24,723 babies included in Köstlin's lists, where the Credé plan had been used, only 0·65 per cent. developed ophthalmia ; indeed, it is clear that the correct use of the silver drops should prevent ophthalmia when the eyes have been inoculated with specific secretions either just before or just after birth. On the other hand, it obviously cannot prevent ante-partum infec-

tion, which I admit to be rare, or secondary inoculation, which I know to be common; hence the method may be expected to fail in a certain small percentage of cases, even when correctly applied, and that has been shown to be so by Köstlin's figures.

To sum up the whole matter, the sole disadvantage of the Credé method, according to my view, is the production of a more or less trivial catarrh of the conjunctiva; and, after all, what is that compared with the risks of being blinded by ophthalmia?

The Obstetrical Society of London acted well and wisely when it caused to be inserted in its midwives' certificate a paragraph touching the disinfection of babies' eyes with a 1 in 4000 solution of corrosive sublimate. The question now is whether, with all the evidence before it, the Society might not be induced to accord a formal approval of Credé's plan and to recommend it for general adoption. That recommendation, coming from such a body, would go far to strengthen the hands of those who for years have been trying to get the plan universally adopted. It would, moreover, have an immense influence in still further reducing the ravages of ophthalmia neonatorum.

PRINTED BY ADLARD AND SON, LONDON AND DORKING.


24ColorCard
CameraTrax.com