

T H E S I S.

THE ETIOLOGY OF OPHTHALMIA NEONATORUM AND SOME
OBSERVATIONS ON ITS TREATMENT.

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THE ETIOLOGY OF OPHTHALMIA NEONATORUM AND SOME
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In dealing with this subject, all the diseases which are grouped together by the definition as given by the Infectious Diseases Notification Act, viz. a muco-purulent Conjunctivitis occurring within twenty-one days after birth, are included.

Many Ophthalmologists look upon this definition as too wide a one, and, accordingly, limit it to a muco-purulent Conjunctivitis occurring from the first to the sixth day. If this alteration were made, doubtless quite a number of genuine cases would be overlooked, as the condition is often so mild in its onset, and the period of invasion sometimes characterized only by Hyperaemia of the Conjunctiva, for the first to the eighth or tenth days, that the condition would escape the attention of the casual observer.

There is an erroneous impression in the minds of a good many medical men that the above disease is in the vast majority of cases caused by the Gonococcus, also there is a widespread tendency among clinicians to arrive at the conclusion that all severe cases of the disease at least, are gonorrhoeal in origin. Not alone have about fifteen different micro-organisms been found to produce the disease, but also what would be clinically considered a typical Gonorrhoeal Ophthalmia Neonatorum, has been proved, time and again, to have been due to a number of other bacteria, notably, the Pneumococcus, the Streptococcus, the Bacillus Catarrhalis etc. Moreover, as was pointed out by Morax, many cases occur where all attempts at discovering the causal organism have been futile.

The more one bases one's diagnosis on the clinical aspect of the disease, the more is one led astray as to the causal organism; therefore, the only method by

which

which a correct diagnosis can be made is by Bacteriological examination.

Certain applications are known to behave far more toxically towards some bacteria than to others, and as advances in treatment are to be looked for in this direction the important rôle for a bacteriological examination is self-evident. In addition to this, the prognosis of a case could, within certain limits, be indicated; for instance, in the case of a Blenorrhoea, caused by the Bacillus Coli Communis, the prognosis would be infinitely more favourable than if the Gonococcus were found.

It must be borne in mind, however, that even where we are dealing with one form of the disease, wide variations are seen; this is especially noticeable in the Gonorrhoeal form where the cases ranging from a mild catarrh, to a virulent purulent Conjunctivitis

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with a sloughing cornea, are found.

Owing to the fact that anti-sera and vaccines are not of much avail in the treatment of this disease, discriminatory bacteriological examinations have not been carried out in the majority of cases; also in observing the treatment for these cases as carried out in the average Ophthalmic Hospital, one only too often notices that these very important cases are relegated to the nurse in charge who applies a uniform treatment for all the various forms of the disease, very much in the way of a panacea; also bacteriological examinations are not carried out as a routine practice and this naturally hampers statistics and does not tend to improve treatment.

Apart from the valuable lessons which would be learnt by a routine bacteriological examination, there is another factor of vital importance. Several cases have come under my notice, where a tactless remark has

caused

caused great disputation and unhappiness among parents of children suffering from this complaint, the reason for this being a rooted idea in the minds of many medical men that Ophthalmia Neonatorum is almost always gonorrhoeal in origin. In two such cases after expert bacteriological examination, was the Gonococcus negatived. In common justice and from a medico-legal point of view there is a strong reason for urging this procedure in every case.

ETIOLOGY.

In 80 consecutive cases which were treated by myself, the following micro-organisms were found in the percentages mentioned:-

<u>Micro-organism</u>	<u>80 cases</u>	<u>Per cent</u>
1. Gonococcus	41	51.25
2. Pneumococcus	10	12.5
3. Koch Weeks	6	7.5
4. Streptococcus	6	7.5
5. Catarrhalis	4	5
6. Staphylococcus	3	3.75
7. Morax-Axendeldt.	2	2.5
8. B. Coli Communis	1	1.25
9. B. Subtilis	1	1.25
10. Pyocyaneus	1	1.25
11. Sterile	5	6.25

In a number of the above mentioned cases several different bacteria were found, but in each case the preponderating one was taken to be the causal factor.

Two micro-organisms which are found fairly frequently viz. B. Influenzae and B. Xerosis, were not encountered.

Mr. Sydney Stephenson in his fine work on the subject found that 64% of cases were caused by the Gonococcus; the reason for the larger percentage of gonorrhoeal cases found by him I believe to be due to the fact that his cases were almost exclusively Hospital patients, where, naturally only the severer forms would come for treatment, whereas the statistics shown above, comprise of both Hospital and a considerable number of outside cases which have been collected by me.

Mr. Stephen Mayo found 57.5% to be Gonococcal, Elsching found 50% due to the Gonococcus, and I think that the last would represent a very fair average.

With regard to the day of onset of the disease, the gonorrhoeal cases are usually thought to present themselves within the first three days. In several of the

cases seen by me, the Blenorrhoeaic stage did not come on until the eighth or tenth day, although a mild Conjunctivitis was present from soon after birth. In these cases Crede's treatment had not been carried out.

In the Pneumococcal cases the clinical appearances closely resembled the Gonococcal, the corneal complication and perforation occurred proportionately as often as in the latter mentioned class. Mr. Sydney Stephenson finds that 10% of cases owe their origin to the Pneumococcus, so that my 12.5% must be pretty near the average.

In the Streptococcal form, the nature of the confinement seems to have played a rather important part; for in these cases the confinements were of a protracted nature, and the maternal discharges unusually septic. The cases took a long time to clear up and the corneal complications when they developed were characterized by large shallow ulceration.

The Staphylococcal cases were mild in character, one of them developed a Dacryocystitis.

Among the Sterile cases was one where the discharge was unusually profuse and the corneal complications very considerable.

The remainder of the varieties were of a mild type. Out of the eighty cases, nineteen had corneal complications and for some curious reason the favourite site for the ulcer was the right eye and just below the pupil, although, in quite a number of cases, the ulcer was central. In all, 70% of the cases started in the right eye. Circular ulceration at the limbus was not seen, this, no doubt being due to the fact that in none of the cases was the chemosis as severe as is usual in the ordinary gonorrhoeal Conjunctivitis.

The fact that 6.25% of cases were sterile and also that the disease, regardless of the bacteriological
cause

cause, should have a favourite eye, and the ulcer, a favourite site, it seems possible that some maternal toxin, probably placental, plus mechanical causes at birth, might play a very definite role in producing the disease. The upper half of the eye is the more efficiently protected during labour, but is the most favourite site for the harbouring of micro-organisms and the elaboration of their toxins, and yet the ulceration is most infrequent here; this seems to prove the possibility of the disease being brought about by some maternal toxin, plus mechanical cause, preparing the soil for micro-organisms, and the more virulent, making the most of their opportunities. In a large number of cases of Ophthalmia, the confinements are rather laborious and one would think that in these cases, some departure from the normal might be present in the placental constituents.

The late Mr. Nimmo Walker of Liverpool, seemed to

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have been carrying out investigations in the right direction, by having both Mother and child under observation in Hospital, when the child was suffering from Ophthalmia.

TREATMENT.

Prophylaxis. According to Mr. Stephen Mayo, there are about two hundred children in England and Wales rendered totally blind by this affection every year. Taking into account, the fact that the statistics of all Lying-In Hospitals prove conclusively that Crede's method, or a modification, reduces the occurrence of the disease from 10.8% to 0.2%, it seems strange that this treatment should not be more universally adopted by the General Practitioner, also that the application of one of the salts of silver should not have been made compulsory with all confinements.

The concensus of opinion at present, seems to be

that

that Crede's silver solution, Silver Nitrate 2%, is disadvantageous in that it causes a Catarrhal Conjunctivitis in a good many cases, and that a 1% solution has proved just as efficacious.

Unfortunately, the installation of Silver Nitrate is not carried out as a routine practice by the majority of accouchiers, probably for the following reasons:- (1) the difficulty of keeping fresh solutions in stock, (2) that there is no convenient drop-bottle procurable for the purpose which would stand the rough handling it would get in an accouchier's bag. These difficulties could be overcome if a small quantity of 1% Silver Nitrate were procurable in a gelatine tube, much the same as is at present used for various eye ointments; this would insure an undeteriorated solution for each case and would be very easily carried about; also the risk of any damage done to the eye with a sharp-pointed glass eye dropped etc. would be obviated.

TREATMENT IN GENERAL.

Once the disease is recognized, the general health of the baby requires the greatest attention. It is of the utmost importance that the health of the Mother, also, should be conserved, for it is a great mistake to change over from breast feeding to artificial, as this at once tells on the child's general health and also the eye condition.

On theoretical grounds, the treatment which would appeal to one most, would be irrigation of the eyes with the specific anti-serum for the particular micro-organism at work; by this procedure, all toxins in the conjunctival sacs would constantly be neutralized by the anti-serum.

Under Mr. Coulter of Newport, (Mon.) I treated several cases of Ophthalmia, each with its specific anti-serum, the applications were made either by douching

or

or by installations. As a check, normal horse serum was used in one eye and the anti-serum in the other, the conclusion arrived at was, that the treatment was of doubtful value, and, in fact, the eye treated by horse serum did as well as the one treated by anti-serum.

With regard to vaccine treatment, the concensus of opinion is, that babies having no complement, this method of treatment therefore is not applicable.

In dealing with the more orthodox treatments, not sufficient attention has been paid in the past, to rendering Collyria and Guttae isotonic with the tears, and this factor, no doubt, is the frequent cause of added irritation.

The irrigation action of Collyria is of the utmost importance in the treatment, especially in the Invasion and Blenorrhoea periods, the aim should be to carry out this treatment as continuously as is compatible with

the good health of the child.

During the period of invasion of the disease, the milder Collyria, such as a 1.4% solution of Sodium Chloride, or a 2.5% solution of Boric Acid, are of most value. The more irritating Collyria such as Lotic Hydrarg Perchlor. 1/5,000 should only be used where the discharge is copious from the onset of the disease, here sufficient Sodium Chloride should be added to the above to render it isotonic.

Of next importance to Collyria, there is one paint which cannot be equalled by any of its substitutes, viz. Silver Nitrate. This application was first introduced by St Ives in the Eighteenth Century. The various organic silver compounds e.g. Protargol, Argyrol, Collosal Argentum etc. although they have many staunch supporters, as sheet anchors in the treatment, are not so reliable in effect. Certainly they are less irritating and are extremely useful in the treatment.

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Among the ointments which are used, Blenolenicet salve, a combination of Aluminium Acetate, Ceresin and American Vaseline, is of immense value in the treatment. Its supposed actions are (1) lubricating, (2) covering the cornea with a delicate film and so preventing corneal complications, (3) inhibiting the growth of organisms, (4) reducing secretion, (5) preventing matting together of the eyelids and so assisting drainage. This application is of the greatest value in the earlier stages, before corneal complications have arisen.

With regard to the use of a myotic, or a mydriatic, it is a safe proceeding to use Atropine gr. 1 ad oz. for central ulcers, and Eserine gr. $\frac{1}{3}$ ad oz. for marginal ones; but if perforation does not take place Atropine should be substituted as soon as the slough has separated from the floor of the ulcer.

In the application of 2% Silver Nitrate paint to

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the everted eyelids, it is an advantage to have Saline solution actually covering the cornea, so as to prevent any damage. The paint should be applied as soon as the discharge becomes copious, and not before, as in some cases the too previous application of the paint seems to have a devitalising effect upon the Conjunctiva, and the disease rendered more severe: installations of Silver Nitrate are not to be recommended at all, for continuous treatment.

Blenolencet salve can be used right from the beginning of the disease to the end, but it naturally loses its chief virtue once corneal ulcers have formed. It should be applied every time the eye receives attention.

Once the pyorrhoeaic stage starts, Silver Nitrate should be applied to the lids every twenty-four hours, in both the pneumococcal and Gonorrhoeal forms, and should be continued without a break until the condition

is quiescent. Relapses are apt to occur if the paint be stopped too soon. Protargol 10% should be used simultaneously, but at more frequent intervals, four or five drops being run into the eye with intervals of from one to three hours.

The general health of the child should be carefully watched and the temperature taken regularly, if there be a rise of temperature free evacuation of the bowels is usually beneficial.

Cases in which metastatic abscesses had formed, were not seen by me, doubtless, they would be a very grave manifestation.

The child should be kept in a dark room, and should be encouraged to open its eyes, and should be prevented from crying, as much as possible, for during this act great pressure is exerted by the lids upon the cornea.

The manipulation of the lids requires the greatest amount of attention, as all handling of them increases the chemosis. No case was encountered by me where the chemosis was so great as to warrant the performance of a canthotomy, nor has the treatment of snipping the conjunctiva for the relief of this, appealed to me, for, no doubt, this procedure would only open the road for the micro-organisms, and produce either an orbital cellulitis or even a general septicaemia. In concluding the general treatment for the disease in its entirety, I wish to emphasise the following points:-

When the disease is mild, use a mild treatment at first, so as to soothe things down and to prevent the possibility of the treatment keeping up the discharge.

The mechanical effect of irrigation with an isotonic lotion is of the greatest importance. This can be brought about either by using an Undine douche, or by

squeezing

squeezing out small pledgets of wool soaked in the lotion, into the eyes. While the discharge is copious the treatment should be carried out hourly through the day, and two-hourly through the night. The blepharospasm, which is at first a great obstacle in the treatment, can be overcome by running warm lotion over the closed lids and exerting a gentle continuous opening pressure on the lids. Instrumentation is to be avoided if possible.

From what is said about the new preparation "Eavine" I would consider that it should open up a most profitable field for treatment in this connection, I have not been able to procure any myself for this purpose up to the present.

SPECIAL TREATMENT FOR EACH BACTERIAL FORM OF THE DISEASE.

Gonorrhoeal Ophthalmia Neonatorum.

The disease usually first presents itself here, on the second or third day, and is evidenced either by an

acute

acute purulent conjunctivitis from the beginning, or sometimes merely shows itself as a mild conjunctivitis with a bead of muco-pus at the inner canthus.

As a general rule, the severer the form, the sooner the onset, but striking exceptions to this rule have come under my notice. In one of the severest cases which I saw, the blenorrhoeaic stage did not present itself until the tenth day of the disease, in spite of every possible precaution having been taken to prevent any contamination with the maternal discharges. Separate utensils were used throughout.

A. Invasion Stage. Period 1 - 5 - 10 days.

Treatment recommended during the period of invasion before the discharge is copious.

Treatment should be carried out at least four-hourly by day and by night.

(1) Irrigation of the cornea and sacs with 1.4% saline about 4 oz. to be used for each eye.

(2) Silver Nitrate 2% to be applied to the everted lids every forty-eight hours and quickly followed by saline irrigation.

(3) Blenolenicet ointment (as mentioned above) to be placed on to the cornea between the lids.

(4) Vaseline to be smeared round the eye generally, to prevent excoriation.

B. Pyorrhoeaic Stage. Treatment to be carried out at least two-hourly by day and three-hourly by night.

(1) Irrigation with Perchloride of Mercury solution 1/10,000 - 1/5,000 rendered isotonic with Sodium Chloride.

(2) Protargol 10%, 4 or 5 drops instilled into each affected eye after each irrigation.

(3) Silver Nitrate 2% painted on everted lids followed by Saline douche, once or twice daily.

(4) Blenolenicet ointment placed into the conjunctival sacs.

(5) If an ulcer be present and situated centrally,

instil

instil Gutt Atropine 1/4% twice daily, if situated marginally Eserine 1/3 gr. in oz. twice daily.

(6) By means of swabs soaked in Perchloride solution keep eyes continually free from collecting discharge.

(7) Where an ulcer threatens to perforate, do a corneal section.

C. Stage of Chronic Blenorrhoea. Treatment for

final stages:-

(1) Continue with Silver application until all hypertrophy of the conjunctiva has disappeared. As a rule there is very little or no discharge at this stage and irrigations are not so necessary.

(2) The corneal complications are to be treated in the usual way, e.g. Atropine, Dionin, Massage with ointments e.g. Ichthyol, Yellow Oxide of Mercury ointment, etc.

Pneumococcal Ophthalmia Neonatorum.

Here, irrigations are carried out as above, so also the painting of the lids with Silver Nitrate 2%.

In one case, anti-pneumococcal serum was tried in the one eye for some time, and the ordinary treatments in the other, but as the eye did not show any improvement, it was discontinued. Here, cauterising the ulcers with Tincture of Iodine seems to arrest their advance.

Catarrhalis and Koch-Weeks Ophthalmia
Neonatorum.

Here, in addition to the irrigations, Argyrol 30% seems to act very beneficially, and the cases seemed to have progressed satisfactorily without Silver Nitrate Paint to the everted lids.

In the Streptococcal cases the treatment which seemed to arrest the condition most was Perchloride of Mercury 1/5,000 irrigations, Silver Nitrate Paint and Protargol 20%.

In the two Morax Axenfeldt Ophthalmias, installations of Zinc sulphate 1%, irrigations of Zinc Chloride,

$\frac{1}{2}$ gr. ad oz. and Zinc ointment were used with satisfactory results.

Pyocyaneus Ophthalmia Neonatorum.

For the one case seen, I tried to obtain Pyocyanese, a filtrate of a four weeks old bouillon culture of Bacillus Pyocyaneus, as used by Löwenstein, but was not able to obtain same. For the same reason, I did not use it in any cases of Gonorrhoeal Ophthalmia Neonatorum, where, I believe it is of benefit.

In the Sterile cases, one was continually haunted with the idea that they might have been gonorrhoeal in origin, although every effort was made to discover the causal organism. For this reason in the severer cases, one felt compelled to carry out a vigorous treatment such as detailed for the gonorrhoeal form.

Unfortunately, I am unable to suggest anything specific for any of the other varieties of Ophthalmia

Neonatorum. Fortunately, they proved comparatively mild, and amenable to treatment with Saline irrigations and Protargol. I have tried Collosal Argentum in a number of different cases but do not think it is as useful as Protargol.

CONCLUSIONS.

I. That the Authorities should be more rigorous in compelling the notification of Ophthalmia Neonatorum; posting up notices on public notice-boards at the various health offices and courts, does not seem to be a very efficient method of forcing the parent to notify the disease, as the order is not sufficiently brought to his notice, and the majority of parents are quite unaware of the existence of such a law.

II. In view of the fact that Crede's method, or its modifications, are beyond dispute in its efficacy in reducing Ophthalmia Neonatorum, compulsion should be

brought

brought to bear on all medical men and midwives to carry out this treatment in every newborn child. No doubt if this were done, lavage of the face and eyes would be more carefully carried out also, and if $\frac{1}{2}$ - 1% solution of Silver Nitrate or a 5 - 10% solution of Protargol be used, few cases of catarrhal conjunctivitis would result, and the treatment would become a popular one with parents. Also, whatever preparation be used, if the Public Health Authorities would supply gratis some convenient and safe instrument containing the solution, such as I previously mentioned, it would insure that the preparation be freshly and correctly prepared.

In Teaching Hospitals, a lecture on Ophthalmia Neonatorum, its causes and results, might be advantageously included in the midwifery lectures. A few illustrative cases shown, would make an unobliterative impression on the minds of all students present.

The advisability of douching the passages of the

Mother

Mother just before delivery, in at least every suspected case of a residual Gonorrhoeal vaginitis, is strongly urged. In a case recently brought to my notice, one child had been partially blinded by Ophthalmia six years previously, at the second confinement the accouchier, who is in every way most careful and efficient, neglected the above precaution, and at the present moment the second child is suffering from a severe Ophthalmia with ulceration of both corneae. This seems to prove that the condition is not sufficiently brought home to the Medical mind.

I am given to understand that in London, midwives are now encouraged to take cases of Ophthalmia Neonatorum to Ophthalmic Hospitals, so as to acquire the necessary knowledge of how to treat these cases. This ought to be part of the training included in a midwife's curriculum. District nurses should also receive similar instruction.

Serum irrigation of the effected eyes will no doubt play an important rôle at some future date, the present non-success of the treatment being probably due to the sera used, not being autogeneous and probably our present technique for preparing sera is incorrect.

With regard to treatment in general the points to be emphasised are (1) that irrigations be carried out as continuously as the general health of the baby admits, (2) that special precautions be taken that the person to whom the care of the child is entrusted during the night be thoroughly reliable, for cases have come under my notice where in fifteen hours of neglect, ulceration and perforation of corneae have resulted.

If the various Children's Welfare Centres which are now being formed would take up the matter, a lot of good would accrue, especially if they would supply parents of affected babies with a pamphlet dealing with the treatment of the disease.

It is only by trying different treatments in each variety of the disease, that a successful method will be arrived at before long.

Finally, I wish to urge that the concensus of statistics be prominently brought before students and practitioners, so as to eradicate the impression that the majority of cases of Ophthalmia Neonatorum are gonorrhoeal in origin, as this is an obstacle to the advance of Medicine, and leads to an unjust imputation on the parents in a large number of cases.
