THE DIPLOBACILLUS OF MORAX AND AXENFELD
IN RELATION TO
CHRONIC BLEPHARITIS

By
H. S. REID.
The Morax-Axenfeld bacillus, its bacteriology and clinical relationship to the conjunctivitis known as diplobacillary conjunctivitis, has been known to ophthalmic surgeons since 1896, when it was first described by Morax (1).

Since that time the bacteriological characters and the clinical phenomena of this organism in relation to the conjunctiva have been freely discussed by various authors in this country and on the continent.

The particular clinical relationship of the organism to which I desire to direct attention in this paper is, its rôle in connection with chronic blepharitis.

It is my object to briefly run over its bacteriology and the clinical features it gives rise to in the conjunctiva, and secondly to describe some cases of chronic blepharitis, in which this organism appeared to be the exciting agent.

Morax first described the organism in connection with cases of conjunctivitis which he designated as "conjunctivite subaigüe".
The characteristics of this conjunctivitis were: - its benignity, bilaterality, long duration and its rapid disappearance under efficacious treatment.

The bacillus he found in this condition was one of from 2-3 U. in length and from 1-1.5 U. in breadth. He noticed that the bacilli were paired, lying end to end, hence the name diplobacilli. The bacilli were usually found in large groups. They stained readily with all the aniline basic stains but were decolorised by Gram's method. He never observed any capsule in connection with the organism, though subsequently the presence of a capsule has been recognised.

Morax found some difficulty in cultivating the organism. It did not grow on gelatine, potatoes, peptonised soup or on milk.

With gelatine agar he got an occasional growth but no subculture.

He found that the organism grew readily on a medium of albuminised agar, made by mixing some serous fluid, such as hydrocele or ascitic fluid, with agar in the proportions of 4 parts agar to 1 part of serum. On this medium at a temperature of 35°C. he found that the organism grew readily. Within 48 hours of inoculation, little, white, greyish colonies appeared on the surface of the medium. These/
These were more transparent at the edges than in the centre of the growth. If left for a day or two these colonies gradually coalesced. Subcultures were easily obtained.

Morax was unable to obtain any reaction on inoculating the conjunctiva of animals with the diplobacillus. A typical conjunctivitis resulted on inoculation of the human conjunctiva.

The commonness of conjunctival affections due to this organism, is seen from the writings of Axenfeld, Hoffman, Peters, Colomb, Ussher and others. Cases are seen repeatedly in the Ophthalmic Out-patient Department of the Edinburgh Royal Infirmary, Leith Hospital, and in the Lauriston Place and Cambridge Street dispensaries, Edinburgh. Cases are found in large numbers in Aberdeen.

From July 1st to December 31st, 1905, Ussher(2) examined 442 cases of conjunctivitis. In 121 of those cases the diplobacillus of Morax was bacteriologically proved to be present.

**Clinical features of diplobacillary conjunctivitis.**

**Age:** Majority of cases are found in patients over the age of fourteen. There are, however, a considerable number to be found in children about the school period. In a series of 274 cases Ussher(2) found that 28.46% occurred in children under fourteen years of age.

**Incubation/**
Incubation period is one of about 36 hours. Onset is marked by a feeling of tiredness and grittiness in the eyes. Marginal surface of the lids becomes red, especially at the outer and inner angles. For this reason the term angular conjunctivitis has been applied.

Subjective symptoms are not of great value in diagnosis of the condition. Patients usually complain of a heaviness and tiredness of the lids.

Eyes have a gritty feeling, as if there were some foreign body present. Headache, photophobia and difficulty in reading, often complained of. The subjective symptoms are often so slight that the condition has only been discovered by patient coming to eye department for some entirely different condition.

The symptom that patients complain most of, is the feeling of gumminess of the lids and their sticking together in the mornings.

This is due to the discharge which is mucopus purulent in character and usually scanty in amount. The discharge is fibrinous in character; not showing so many cells as in the more acute forms of conjunctivitis, such as that excited by the Koch Weeks bacillus.

The conjunctivitis is practically always bilateral. Starts in one eye. In a few days, the other eye becomes affected also.

The/
The marginal surface of the lids is usually somewhat hyperaemic. The palpebral conjunctiva is always red and swollen. There may or may not be injection of the bulbar conjunctiva, usually unaffected. In a large number of cases there is redness of the skin at either the outer, inner, or both canthi.

Ussher(2) in a series of 442 cases of conjunctivitis found 121 to be diplobacillary cases.

In 42% of the 442 cases angular conjunctivitis was noted, in 37 of those the diplobacillus was found. He therefore concluded:

(1) That angular conjunctivitis occurred in about one-third of all diplobacillary cases.

(2) That when angular conjunctivitis was present, it was almost pathognomonic of the presence of the diplobacillus.

Colomb(3) found angular conjunctivitis in only 28% of his diplobacillary cases.

Nack and Neuman(4) in 54% of their cases.

Traquar(5) found the diplobacillus present in cases where one, both or neither canthus was affected.

Ussher in 238 cases of bacteriologically proved cases of diplobacillary conjunctivitis, found six to have corneal ulcers. Those were all very superficial in type. In the same series of cases he/
he found six to have enlarged follicles.

The most important points on basing a diagnosis of diplobacillary conjunctivitis, are:

(1) Age: usually over fourteen years of age.
(2) Congestion generally limited to the palpebral conjunctiva.
(3) The presence of angular conjunctivitis which is present in a large number of cases and is almost pathognomonic of diplobacillary conjunctivitis.
(4) Scanty discharge.
(5) Feeling of grittiness in the eyes.

Treatment.

Zinc has a specific affect on the diplobacillus when in the human conjunctiva.

Mercury as an antiseptic has a very beneficial affect on all inflammatory conditions of the conjunctiva. In diplobacillary conjunctivitis, it has practically no effect. I have seen patients at the Edinburgh Royal Infirmary with diplobacillary conjunctivitis, who have been treated for long periods with Mercury, without improvement.

Mcrax(1) used Zinc Sulphate 1 in 40. Application of this two or three times daily effected a cure in 5 to 8 days.

At the Edinburgh Royal Infirmary, Zinc oxide gr. XV to ʒp as an ointment and Zinc sulphate gr./
gr. I or II to \( \frac{1}{3} \) I as drop is used with very beneficial results.

Morax characterised this conjunctivitis by its benignity, bilaterality, long duration and its rapid disappearance under efficacious treatment.

The most marked characteristic of the diplobacillary conjunctivitis is its persistence. Unlike the more acute forms of conjunctivitis which so often run an acute course of from two to four weeks' duration, this form if left untreated usually persists for many weeks, months or years.

Patients are seen at the Edinburgh Royal Infirmary frequently, who have been suffering from sore eyes for months. On examination they are found to have diplobacillary conjunctivitis. The history, in the majority of cases, is the same. They say "they got a cold in the eyes". Lids became somewhat reddened and stuck together in the mornings.

In many cases they considered the condition too trivial to seek medical advice.

Patient has recurring attacks of conjunctivitis with intermittent periods when the symptoms are less severe but never quite gone. Every time patient gets run down or the eyes are exposed to some form of irritation, the condition lights up. During an attack the organism can be found in large numbers.

During/
During intermittent periods they are more difficult to find but can usually be obtained in the neighbourhood of the caruncle. Many cases of this nature have been quite cured after a fortnight's application of Zinc.

What happens to those cases which are left untreated or where the treatment is ineffectual? Zinc was used as a therapeutic agent by practitioners and ophthalmic surgeons long before Morax described its use in cases of diplobacillary conjunctivitis.

Doubtless many cases due to the Morax-Axenfeld bacillus were cured in this way.

In cases where the condition has been left untreated and where no attention has been paid towards keeping the lids clean; it seems probable that some organic change must take place in the lids, sooner or later.

There is a condition of the eyelids known as chronic blepharitis, ulcerative blepharitis or marginal blepharitis.

The condition is distinguished by its chronicity and by the revolting disfigurement it gives rise to. It is no uncommon thing to see men and women walking about the streets with ulcerated and thickened eyelids, devoid or almost devoid of eyelashes. Frequently in this condition there is well marked ectropion of the lower lids, causing great/
great disfigurement to the face.

The bacteriology of this condition has been investigated by Angus McNab(6).

He says: "There is a very definite association of the Morax-Axenfeld bacillus with marginal blepharitis. That angular conjunctivitis and marginal blepharitis are in close association seems probable, as we find the Morax-Axenfeld bacillus months and even years after the initial attack, the condition becoming more and more chronic.

Angular conjunctivitis has well marked clinical features, but if left untreated gradually loses its clinical entity and becomes what is known as a chronic conjunctivitis. From this, marginal blepharitis evolves itself with all its revolting disfigurements."

McNab finds that the larger number of cases of angular conjunctivitis do not go on to marginal blepharitis, the condition remaining the same for years.

On making a bacteriological examination of cases of chronic blepharitis, McNab considers the following facts to be established.

(1) That the majority of cases have the Morax-Axenfeld bacillus in their secretions.

(2) That the bacillus can be most readily obtained where the lesion is worst, namely, at the angles and margins of the lids.

(3)/
During the so-called cured times, the diplobacilli are very difficult to find, and during relapses plentiful.

They exist at the onset of the condition and still flourish after the disease has lasted a lifetime.

Although one often sees people on the streets suffering from this chronic condition, they are not seen much in Hospital.

From October 1st, 1906 up till the end of January, I only succeeded in obtaining ten typical cases. The history and clinical features those cases showed, I now describe, along with the bacteriological results obtained.

Scrapings were taken in every case from the palpebral conjunctiva of both eyes, just internal to the internal marginal border. A stroke culture was made on a medium of blood serum. Tube was incubated for 48 hours at a temperature of $37^\circ C$.

All the cases examined were in moderately good health, apart from the eye condition. In no case was there any history of injury to the eye or of tear sac trouble.

Case I. Edward Wilson; six years; schoolboy.

Complaint: stickiness of eyelids on both sides; inflammation had been present off and on for/
for three years. Child suffered greatly from the lids sticking together in the mornings. Mother knew to no cause for the onset.

Examination showed the ocular conjunctiva to be quite healthy. The palpebral conjunctiva was much injected. There was a scanty discharge present, muco purulent in character.

There was a distinct organic change in the eyelids, both upper and lower. They were very much thickened. Most of the cilia had dropped out. The remainder were matted together into clumps, with crusts of dried secretion adhering to the roots. The change was best marked in the lower lids. In place of a well marked marginal surface with an external marginal border and an internal border in apposition with the globe of the eye, there were no defined margins. The marginal surface merged directly into the palpebral conjunctiva.

The marginal surface was very hyperaemic. There was slight ectropion of the lower lid present so that the tears had not easy access to the punctum but tended rather to run on to the cheek. The child was not very clean and little attention appeared to have been paid to the condition.

Scrapings were taken from the palpebral conjunctiva of both sides.

After 48 hours there were numerous little round areas/
areas of liquefaction on the medium, in addition to numerous colonies of what looked like staphylococcus aureus. On microscopic examination the Morax-Axenfeld bacillus was found to be present at the bottom of the little liquified areas. Staphylococcus was also found in large numbers. Subcultures of the Morax bacillus were easily obtained.

**Case II.** Francis Fraser: age 41.

**Complaint:** stickiness of the lids and discharge from the eyes. Condition has been going on for twenty years.

Patient finds that every morning the lids are glued together. He suffers a good deal from frontal headache. Frequently the condition becomes much worse, the lids becoming swollen and painful. At onset there was a feeling of grittiness in the eyes with sticking together of the lids in the mornings.

First attack lasted for six months. Has had intermittent attacks since. During so-called cured times, the eyes feel all right but inflammation sets up whenever he gets run down. Patient has been treated on several occasions with ointment.

Examination showed some ectropion of both upper and lower lids, especially at the outer and inner/
inner angles. Cilia had almost entirely disappeared from the lower lids.

There was not a great deal of disfigurement. Lids were a little thickened and the marginal surfaces inflamed.

The palpebral conjunctiva was red and inflamed looking. Ocular conjunctiva was also a little injected. Eyes were otherwise healthy.

Cultures were taken from the palpebral conjunctiva of the lower lids. Morax bacilli were found, few in number.

A film made from a 48 hours culture showed many involution forms. The staining was very irregular in many. The organism varied greatly in size. In some cases there was marked thickening of one pole of the organism. Numerous colonies of the staphylococcus aureus were also present.

Case III. William Barrett: age 44.
Complaint: pain in the eyes.
Duration - 18 years.

Condition started without apparent cause on the left eye. About a week later the other eye became infected.

From the history the conjunctivitis appeared to resemble closely that of diplobacillary infection. It was not severe, and did not affect the ocular conjunctiva. Suffered mostly from the eyes/
eyes sticking together in the mornings and from headache. Ever since time of onset patient has suffered from intermittent attacks of inflammation. Has been treated for the condition on several occasions. Bathed the eyes for a long time with calamine lotion.

On examination of the condition, it had the appearance of a typical diplobacillary conjunctivitis. Palpebral conjunctiva was inflammed with a good deal of redness over the skin at the outer and inner angles. The ocular conjunctiva was healthy. The marginal surface of the lower lids was reddened, but there was no apparent organic change in the lids themselves. The borders of the lids were unchanged. Hair follicles did not seem to have been affected as the cilia were all present. There were no crusts lying at their roots.

On bacteriological examination the staphylococcus aureus and the Morax bacillus were found to be present.

This case differed markedly from the two previous ones, in that, although the inflammation had been going on for eighteen years, there was very little change in the appearance of the lids.

There was no sign of any ulceration on the lids, causing cicatricial contraction and distraction of the lid margins. Patient had always been very careful to keep the lids clean and so prevented crusts/
crusts of secretion from collecting on the lids.

**Case IV.** Freddy Sellers: age six.

**Complaint:** stickiness of the eyelids.

**Duration:** one year.

Mother thinks the child got a cold in the eyes. Eyelids became red and there was a good deal of muco purulent discharge. The inflammation was not very acute. Condition has troubled the child off and on ever since.

On examination the cilia were found to be all matted together, many hairs having dropped out. Marginal surface was very hyperaemic.

Palpebral conjunctiva was much injected. No change on the ocular conjunctiva or cornea. From the history the case looked like one of diplobacillary infection, yet the organism could not be differentiated at the time of examination. Numerous colonies of staphylococcus aureus were found on cultivation.

Here was a case which in the space of one year looked as if it would pass into a chronic ulcerative condition if left untreated.

**Case V.** Cathie Young: age thirteen.

**Complaint:** inflammation of eyelids.

**Duration:** two years.

Condition started in the left eye. A week or so later the right eye became infected. There was a/
a good deal of muco purulent discharge and eyes tended to stick together in the mornings. For the last two years the condition has continued with periods of acute exacerbation.

There was a good deal of disfigurement of the lids. Both upper and lower were thickened. Marginal surface was hyperaemic. Few cilia present. Many crusts were lying on the lids.

Palpebral conjunctiva was red and inflamed looking. Ocular conjunctiva was injected.

Bacteriological examination showed the Morax bacillus and staphylococcus aureus to be present in large numbers.

This was a typical case of chronic ulcerative blepharitis.

**Case VI.** John Cooper: age twenty years.

**Complaint:** inflammation of the eyelids.

**Duration** - ten years.

Came on after measles. Suffered from lids sticking together in the mornings and a feeling of grittiness in the eyes. At the time of examination there was a constant discharge from the eyes and the lids stuck together in the mornings. Marginal surfaces hyperaemic. No marked organic change on the lids. There was some ulceration present.

Palpebral conjunctiva was markedly injected.
Cilia were few in number. Many crusts were lying at their roots.

Ocular conjunctiva and cornea were healthy.

No Morax bacilli were found on cultivation but were numerous colonies of staphylococcus aureus present.

Case VII. Mrs McIntyre: age 57 years.

Complaint: pain in the eyes.

Duration - 22 years.

Patient said she got a chill in the eyes 22 years ago. Got an attack of conjunctivitis.

This resembled diplobacillary conjunctivitis in its symptoms. There was a feeling of grittiness in the eyes with a scanty discharge.

Condition was not very severe at time of onset. Ever since then she has been subject to attacks of conjunctivitis. Eyes have gradually got disfigured. Patient has bathed eyes regularly with antiseptic lotions and has applied mercurial and other ointments from time to time.

Upper and lower lids were much thickened and deformed. Very few cilia remained. There was some ectropion of the lower lids. There were signs of old and chronic ulceration of the lid surfaces.

The palpebral conjunctiva was very much injected.

On cultivation only one colony of Morax bacilli was found. Numerous colonies of staphylococcus aureus were present.
Case VIII. Bella Eadie: age 18 years.

Complaint: diminution of the palpebral fissure of both eyes.

Duration - 9 years.

At the time of onset patient complained of a feeling of grittiness in the eyes and a sticking together of the lids in the morning. There has been a chronic inflammatory condition of the lids ever since. Has never had any previous treatment. Both eyes have been affected throughout. Was admitted to Ward XLII Edinburgh Royal Infirmary on Saturday, January 24th, 1907, for shortening of the palpebral aperture. Had canthoplasty performed on Saturday, February 2nd.

At time of examination there was great deformity of the lids, both upper and lower. They were very much thickened and ulcerated, causing marked cicatricial contraction, and so diminution of the palpebral fissure. There was complete loss of differentiation between marginal surface and borders. Practically no cilia on the lids. Palpebral conjunctiva was much injected.

Ocular conjunctiva and cornea were both healthy on the left side. On the right cornea there was an old ulcer.

Cultures were taken from the palpebral conjunctiva on both sides but no Morax bacilli were found.
Case IX. Jessie Findlay: age 25 years.
Complaint: pain in the eyes.
Duration - 5 years.
At onset, complained of grittiness in the eyes and of the lids sticking together in the mornings. Condition has been going on intermittently ever since. Has been treated with various ointments. For the last month or so zinc oxide has been tried. Patient says the discharge has been less since she started using it.

There was considerable deformity of the left lower lid. All the cilia had disappeared. Lid was much thickened. The marginal surface was rounded, the internal marginal border not being in apposition with the eyeball. The upper lid was a good deal thickened, many of the cilia also having disappeared. On the right side there was a similar condition but not so well marked. Palpebral conjunctiva was injected. Ocular conjunctiva and cornea were healthy.

On bacteriological examination numerous colonies of Morax bacilli were found. The staphylococcus aureus was also present.

Case X. Andrew Kirkwood: age 25 years.
Complaint: running from the eyes with inflammation of the lids.
Duration - twenty-two years.
Believes/
Believes that he was directly infected from some other person suffering from conjunctivitis. Ever since onset patient has suffered from discharge from eyes.

There is great deformity of the lids. They are much thickened. Considerable ectropion of the lower lids present, tears running over the cheek. Most of the cilia have gone. Numerous crusts lie on the marginal surfaces of the lids. Palpebral conjunctiva is injected. Ocular conjunctiva and cornea are healthy.

On bacteriological examination only the staphylococcus aureus was found.

The features in common which those cases had, were:

(1) Comparatively long duration.
(2) Symptoms were benign throughout the course of the disease and at the onset.
(3) Scanty discharge, muco purulent in character.
(4) At onset and throughout course all complained of a feeling of grittiness in the eyes and a sticking together of the lids in the mornings.
(5) With the exception of Cases II., V., and VI., where there was slight ocular injection and Case VIII. where there was an old corneal ulcer on the right eye, the palpebral conjunctiva and lids were alone affected.
In short, the symptoms were very similar to those of a typical diplobacillary conjunctivitis, apart from the complications resulting from the chronic condition of the lids.

Scrapings were taken from the palpebral conjunctiva, and cultures made on blood serum.

In six out of the ten cases the Morax-Axenfeld bacillus was found to be present.

The staphylococcus aureus was found in every case. The colonies in every case were very numerous. No investigations were made as regards testing the pathogenic properties of the staphylococci.

Parson(7) says that staphylococci are constantly found in the skin at the edge of the lids and often find their way into the normal conjunctival sac. The staphylococcus albus in a non virulent form is common.

Axenfeld(8) says that the staphylococcus is a constant inhabitant in the normal lids. Usually of the albus variety. Of very slight virility. He says: "It is possible that these organisms may become virulent under certain conditions as in people predisposed to disease, e.g., scrofulous and anaemic people." Axenfeld obtained the staphylococcus albus from six normal lids. In only one case did the organism prove to have pyogenic properties on inoculation of a rabbit's cornea.

Terson/
Terson and Cuenod (9) from twenty normal lids obtained always the staphylococcus albus. In only one case did inoculation into the rabbit's cornea produce a purulent keratitis. The staphylococcus aureus was found more rarely on the normal lid. Sometimes it proved to be slightly pathogenic, other times distinctly so.

Axenfeld says that the staphylococci and the xerosis bacillus are the only constant inhabitants of the normal lids. Besides them all kinds of bacteria may be found accidentally. These accidental organisms are found to be innocuous on inoculation of the rabbit's cornea. These organisms are found at the mouths of the glands, in the hair follicles and in the superficial layers of the epithelium.

Harman (10) found the diplobacillus four times in the conjunctiva of 150 normal subjects. Griffiths (11) found it nine times in 210 cases. Biard (12) says, the organism is never met with in the normal conjunctiva but is a constant inhabitant of the nasal fossa.

McNab (6) says, the Morax bacillus is very hard to find during the so-called cured times of chronic blepharitis when the symptoms are much less acute. It is probable, therefore, that the organism was present in the four cases in which negative results were obtained on cultivation.

In/
In these ten cases there were two distinct groups:

1. Where there was merely hyperaemia of the marginal surfaces without any ulceration or destruction of the lid margins.

2. Where there was not merely hyperaemia of the lid surfaces but ulceration with marked thickening of the lids, loss of the cilia and destruction of the lid margins.

Cases I., III., and VI. belonged to Group I. and the remainder to Group II.

That the degree to which the disease had extended is not dependent on its duration, is evident, from the fact that Cases III. and VI. had suffered for eighteen and ten years respectively without much organic change: whereas in Case V. patient had only suffered for two years and yet the lids were thickened and disfigured. The constitution of the patient must of course be considered.

Presuming that every case suffered initially from diplobacillary conjunctivitis it would appear that some other agent or agents must be at work causing this ulcerative condition.

In blepharitis squamosa, a condition where there is hyperaemia and a scaly condition of the lids similar to seborrhoea of the scalp. Cuenod (9) found that the organisms present were similar to those found on the normal lid, but the growth/
growth on culture was much more luxuriant. Bayersdorfer (13) found the same thing. Axenfeld (8) says that the condition of hyperaemia is influenced by anaemia scrofula, errors of refraction and occupations irritating to the eyes.

There are two opinions held as regards the causation of an ulcerative blepharitis:

(1) Von Michael (14) considers that it is primarily an eczema, the hair follicles being infected secondarily and continuing the disease.

(2) On the other hand, Winselmann (15) holds that blepharitis ulcerosa is primarily a sycosis. Axenfeld (8) says that undoubtedly many cases are simply cases of sycosis, but that in an advanced case you cannot tell whether the condition started as an eczema or as a sycosis.

Cuenod (9) in a series of twelve cases made cultures from the pustules under the crusts found on the lids. He found the staphylococcus aureus eight times pure; twice along with the staphylococcus albus; twice found the staphylococcus albus in pure culture. The aureus was found to be virulent on inoculation of the rabbit's cornea, the albus only slightly. In ten other cases he got the aureus colonies pure on every occasion.

Bayersdorfer (13) and Axenfeld (8) found always the aureus. Deyl (16) rubbed on to the normal lid/
lid margins the staphyloccocus pyogenes aureus from pure culture. He produced styes, folliculitis and eczema of the lids.

Axenfeld (8) says that conjunctival inflammation may result from chronic blepharitis and vice versa blepharitis may be the result of conjunctival or tear sac trouble.

He says that acute varieties of conjunctivitis are of little importance here. It is rather the chronic conditions and among them, those with tear sac trouble.

In the first rank and of the greatest practical importance is the diplobacillus. The hyperaemia marginalis and especially the intertrigo like form which involves the angles, depends, in many cases, exclusively on a diplobacillus conjunctivitis and is readily cured by Zinc.

If ulcerative changes appear on the lids in diplobacillary conjunctivitis the pustules show the same bacteriological findings as in other cases of ulcerative blepharitis.

He says: "The diplobacilli alone never produce suppuration in the follicles. Nevertheless the healing of the blepharitis ulcerosa will depend on the removal of the diplobacillus.

In the ten cases I have described there was well marked palpebral conjunctivitis.

There/
There was no history in any case of tear sac trouble or of a primary condition of sycoisis. I conclude, therefore, that in those cases the blepharitis was secondary to a conjunctivitis of a mild type, namely, the diplobacillary conjunctivitis.

Numerous colonies of staphylococcus aureus were found in every case. These apparently were the causal agents of the blepharitis, the diplobacillus being the exciting agent.

In some cases ulceration had taken place and in others it had not.

The lack of ulceration and infiltration resulted, in some cases, from the short duration of the disease, and in others because the patients had always kept the lids clean and so prevented ulcerative changes from taking place.

As regards the treatment of the individual cases:

Cases I., III., IV., IX., and X. were treated solely with zinc oxide ointment and zinc sulphate drops.

Cases I. and IV. after two months' treatment appeared to be quite cured. There was no injection of the palpebral conjunctiva remaining, the lids were clean and the cilia had come in again. There was no discharge from the eyes in either case.

In/
In Case I., the lids, still thickened somewhat but looked quite healthy. In Case IV. the lids looked absolutely normal.

Case III. after three months' treatment showed no signs of improvement. Patient admitted that he had not followed the instructions given him. Neither ointment or drops had been applied regularly. Patient was not in very good general health and was very poor. Case IX. after three months' treatment showed some improvement.

The discharge was less and the eyes were less painful. Lids still showed a condition of hyperaemia and the palpebral conjunctiva was still somewhat injected. Case X. sailed for Canada a few weeks after treatment had been started. He expressed himself by letter to be much benefited by the treatment. Case VI. on January 16th was put on a similar treatment to the previous cases. After ten days he felt so much benefited that he stopped its application. Eyes rapidly became worse again. On March 27th, ichthycl ointment was added to the other treatment. On April 15th the eyes looked much better. Palpebral conjunctiva was very little injected. The marginal surface of the lids was still a little hyperaemic but clean. No crusts on the lids. Cilia appeared to be coming in again.

Case II. was treated solely with boracic lotion applied/
applied frequently. Seen two months later: lids were much cleaner and patient said the eyes felt better. Palpebral conjunctiva was still inflamed looking.

Case VII. was treated with iodiform gr. X.

Ung. Lanolin \( \frac{1}{2} \). Eye wash of perchloride of Mercury \( 1-5000 \). Nitrate of silver, gr. X, ad \( \frac{1}{2} \) was frequently painted on to the palpebral conjunctiva. Treatment was started on January 21st. On the 3rd of April eyes looked much better; much less discharge; lids did not stick together so much in the mornings. There was no matting of the cilia; others were coming in. Hyperaemia of the marginal surface was much less marked. Deformity of the lids was still in \textit{stato quo}. There was still a well marked injection of the palpebral conjunctiva.

Case V. was treated with resinol ointment. Case has not been seen since treatment was started.

Case VIII., canthoplasty was performed on this case on February 2nd. She was then put on ichthyol and zinc ointment. Seen on April 22nd: patient said she had applied the ointment regularly. Deformity was in \textit{stato quo}; no cilia had come in. There were still numerous crusts on the margins of the lids. Palpebral conjunctiva was very much less injected. Patient said she felt a good deal better.

\( \text{Zinc/} \)
Zinc was used as a therapeutic measure in seven out of the ten cases. With the exception of case III. where the instructions had not been followed out, the conjunctival condition was much improved. Cases I. and IV. were completely cured. Here the blepharitis was not of very long duration, nor so advanced as in some of the other cases.

In the very chronic cases where there was well marked ulceration present, the blepharitis, although improved, was still present. In Cases II. and VII. ordinary antiseptics were used. The blepharitis in those cases was allayed but the conjunctival inflammation still continued and so the chronic inflammation of the lids was sustained.

I consider those cases to be of considerable clinical interest, in that they show:

(1) The value in recognising a diplobacillary conjunctivitis early and in treating it effectually.

(2) The great frequency in which the diplobacillus is the exciting agent of an ulcerative blepharitis.

(3) The necessity in the treatment of chronic blepharitis of removing that exciting agent.

I have to thank Drs Sym and Sinclair for the facilities they have given me in preparing this Thesis.

Literature/
Literature.

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