Clinical Lecture

ON SOME TYPES OF CONJUNCTIVITIS.

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INTRODUCTORY.

THE conjunctiva, the mucous membrane lining the inner surfaces of the eyelids, whence it is reflected on to the globe of the eye, of which it covers the anterior third, may be described as consisting of three portions, the palpebral, the fornices, and the ocular; the latter may be subdivided into scleral and corneal. The palpebral conjunctiva lines the inner surfaces of both upper and lower lids, at the edges of which it is gradually transformed into the epithelium of the skin; it is closely attached to the tarsal plates, and thence passes into the fornices, where it is reflected from the lids on to the eyeball; they consist of some small folds placed parallel to the length of the lids; this arrangement allows the eye to move freely in all directions, irrespective to a great extent of the lids. The scleral portion extends from the fornices to the limbus, whence it passes into the corneal conjunctiva; it is very loosely attached to the subjacent sclera, and on the cornea the membrane resolves itself in the anterior epithelium of that structure. Near the caruncle is a fold of the membrane, the plica semilunaris, which corresponds to the membrana nictitans present in birds and many quadrupeds. Histologically the conjunctiva consists of two portions, the epithelium and the substantia propria. The character of the epithelium varies in different positions, the palpebral portion consists of a laminated cylindrical type in two layers, of which the cylindrical cells are superficial; at the fornices three layers are found, and in the scleral portion the epithelium is gradually becoming stratified, being definitely so at the limbus. Acinous mucous glands (Waldeyer's glands) are found along the convex border of the tarsal plates, analogous glands (Krause's glands) in the fornices. Goblet cells are found in all parts of the conjunctival epithelium, but especially in the fornices and scleral portions; their presence is of the utmost importance, for it is due to their secretion moistening and so protecting the conjunctiva and cornea that we are enabled to remove the lacrymal gland without any ill effects. The substantia propria is of an adenoid type—that is, it consists of fibrous connective tissue containing many lymphocytes, especially in its superficial layers; it is this fibrous layer which is closely connected to the tarsal plates, and into it the posterior lamella of the levator palpebrae superioris is inserted. The blood supply is derived from the palpebral and from the anterior ciliary arteries.

PATHOLOGY OF CONJUNCTIVITIS.

As in all forms of inflammation there is a dilatation of the lymphatics and of the conjunctival blood vessels, with exudation of serum and diapedesis, leucocytes, lymphocytes, and plasma cells are found in abundance, the lymphocytes normally present in the substantia propria of the conjunctiva are largely increased in numbers; this structure being of loose connective tissue is easily distended with exudation, thus causing the chemosis so frequently seen. The epithelium itself is swollen, thus accounting for the loss of transparency so often noticed; the goblet cells are increased in numbers, especially in the chronic types of inflammation; indeed, new tubular glands are even formed. The secretion exuded varies in consistence, from the aqueous fluid seen in epiphora resulting from a reflex stimulation of the lacrymal gland to thick muco-pus or even pus; this discharge contains, in addition to the lacrymal secretion, plasma exuded from the blood vessels, mucus from the goblet cells and acinous glands, and a varying number of leucocytes and pus corpuscles.

CLASSIFICATION.

As I only intend to discuss a few types of conjunctivitis to-day, I will not attempt a classification of the various forms of this disease.

Catarrhal Conjunctivitis.

Catarrhal conjunctivitis may be divided into acute and chronic. The causes of the acute variety may be divided into predisposing and exciting. The former consist in the main of a lowering either of the local vitality, as by a cold or presence of a foreign body, or of the general vitality, from defective hygienic surroundings, and insufficient or unwholesome food, this latter cause being met principally in the class of patients who come to hospital for treatment. The exciting causes are several micro-organisms, of which the bacillus discovered by Koch in Egypt in 1884 and by Weeks in New York in 1885 is by far the most common. This bacillus, usually called the Koch-Weeks bacillus, is a short fine rod, which is difficult to grow in culture; it is non-motile, stains faintly with aniline dyes, and is decolorized by Gram's method. The bacillus attacks all ages, but most frequently the young; it causes a muco-purulent conjunctivitis which is highly contagious. Handkerchiefs, towels, etc., are the usual media of contagion, and when one member of a household is attacked by this disease, usually every other member is subsequently affected. It is this disease which sometimes breaks out in schools, and is then known as school ophthalmia. The pneumococcus also gives rise to epidemics, usually among the young. Gelpke described a form of the keriosis bacillus as the *Bacillus septatus* in an epidemic of this disease. Among other micro-organisms found streptococci may be mentioned; a pure culture is seldom obtained, and in those cases in which it is found the prognosis is usually not good, as in the following instance:

A. F., aged 2, was brought to hospital with a history of the left eye having been sore and inflamed for the previous three weeks, subsequent to the appearance of a dry eruption on his face. Two other children in the house had had "colds" in their eyes recently; there was no family history of syphilis or of tubercle. There was slight oedema of the left eyelids, and some glueing of the lids in the mornings; there was a large swelling in the region of the left parotid gland, which had lasted for three weeks, and a number of enlarged lymphatic glands in the posterior triangles of the neck; there were no pediculi. He was treated on the lines to be indicated presently. Three days later there was chemosis, marked oedema of the lids, muco-purulent discharge, and the eruption on the face had become purulent in places. Four days later the enlarged glands were in a similar condition, the eruption on his face was less and cleaner, the oedema of the lids was a little decreased, but they were still reddened, the chemosis had increased, the muco-purulent discharge was increased and free, there was a hypopyon half filling the anterior chamber, the cornea was cloudy and contained a large central septic ulcer, and, in short, the eye was lost. The pus taken from this case gave a nearly pure culture of streptococci.

The symptoms of this condition vary in severity; a history is usually given that the sufferer caught a cold in the eye, or caught it from another child, both eyes being affected at once, or one shortly after the other; the child complains of more or less photophobia and burning of the lids; there is some epiphora, and the sight may be dimmed by shreds of mucus floating on to the cornea; the lids may be stuck together in the morning with tears and muco-pus pent up inside. The lids are sometimes oedematous, the ocular conjunctiva is injected; hence the name "pink eye." Chemosis is frequent, and on everting the lids the palpebral conjunctiva is seen to be markedly injected, flakes of muco-pus floating about in the tears; the quantity of this and the amount of injection vary with the severity of the inflammation; this condition may be complicated by the presence of corneal ulcers or iritis, as in the following case:

M. M., aged 8 months, was brought to hospital with the usual symptoms detailed above, which had commenced a week previously; ordinary treatment was adopted; four days later the child was better and could open her eyes a little herself, though the edges of the lids were sore. The child was not seen for six days, when there was an exacerbation of the disease in the right eye, and in addition in the left there was diffuse suppurative keratitis, with a central septic ulcer. Again, she was not brought back for ten days, when the condition was very similar. Four days later she was better, the ulcer had healed, and she could open her eye herself a little; three days later she was almost well.

This condition usually lasts for a week or a fortnight, but cases are frequently met with in which there is definite rhinorrhoea.

A. C., aged 3, was brought to hospital with a history of sore eyes for the previous three weeks; he had mild symptoms of the complaint, coupled with double otorrhoea, and with

rhinorrhoea. He was seen regularly, and the condition slowly improved. Three weeks later the rhinorrhoea and otorrhoea both ceased, and he could open his eyes slightly. A fortnight later, he had no photophobia, could open his eyes easily himself, and was almost well.

The treatment of this complaint is simple. I am in the habit of ordering for use at home boracic lotion to bathe the eyes frequently, with the application of boracic ointment to the inner sides of the lids night and morning, and of performing myself what Darier calls "savonnage"—that is, brushing the everted lids with either argyrol or protargol once a day or less frequently, according to the severity of the symptoms; some surgeons use a solution of silver nitrate, but I reserve this powerful caustic for those cases which will not react to the above treatment. The following cases illustrate the result of treatment of this condition:

H. S., aged 10, was brought to hospital complaining of sore eyes for a week; both palpebral and ocular conjunctivae were inflamed, and muco-pus was floating in the sac; she was ordered boracic lotion and ointment for home use, and savonnage was performed; her attendance was very irregular, still the same treatment was continued, and in five weeks she was quite well.

S. B., aged 12, was brought to hospital with a history of having had sore eyes for five weeks. The conjunctiva was injected, the cornea clear, and muco-pus was present in the sacs; there was also photophobia. He was ordered boracic lotion for home use, and the lids were painted with argyrol; this treatment was continued for four visits, and he was quite well in three weeks.

Chronic catarrhal conjunctivitis may result from a preceding acute attack which has not resolved, or from the irritation of a foreign body; it is frequently seen in children dating from an attack of measles; in adults it is often seen in patients whose occupation exposes their eyes to constant irritation by injurious gases, particles of dust, smoke, etc.; in the aged it is frequent. Darier mentions an alcoholic type. In whatever manner started, the most frequent cause of the continuation of this complaint is an error of refraction, especially astigmatism. Various bacteria are found in the conjunctival sac, but there is one form of micro-organism, the bacillus discovered independently by Morax and by Axenfeld in 1896, a diplobacillus decolorized by Gram's method and difficult to grow in culture, which gives rise to a definite type of chronic conjunctivitis, known sometimes as "chronic angular conjunctivitis." The subjective symptoms of this affection are very definite: an aching of the eyes, a feeling of heaviness in the lids and of sand in the eyes, which becomes more marked towards evening; the lids are glued together in the morning, and the patient will say that he has to bathe the eyes in order to open the lids. Objectively there is no swelling of the conjunctiva; the fornices and palpebral conjunctiva are injected; there is, if anything, diminished secretion. In angular conjunctivitis the edges of the tarsal plates are injected. This condition does not, as a rule, resolve spontaneously, but goes on to involve the edges of the lids, causing loss of the cilia and in elderly people it will cause eczema of the skin of the lower lid, which in its turn will set up ectropion. The treatment may be divided into general and local. In the first place, we must remove the patient into better hygienic surroundings, or protect his eyes by means of goggles from the effects of dust, etc., and prescribe suitable glasses for any error of refraction; locally, an astringent lotion such as alum, tannin, or zinc sulphate, is used to bathe the eyes, and a simple ointment is placed inside the lids night and morning. The following case is a typical example:

L. B., aged 15, came to hospital complaining of sore eyes of two months' duration. She had suffered from sore eyes on and off for some years; there was always more or less blepharitis, the eyelashes were deficient, especially in the lower lids, and there was a leucoma adherens in the left eye, which was amblyopic; there was constant unilateral convergent strabismus, with an angle of about 20 degrees, the right eye being the fixing eye. The conjunctivitis in the right eye was complicated by a fresh ulcer on the cornea. Atropine was instilled into the right eye, both eyes were constantly bathed with boracic lotion, and boracic ointment smeared on the edges of the lids. In three weeks the ulcer had quite healed, and the blepharo-conjunctivitis was distinctly less. A month later, as the conjunctivitis was still present, the refraction was examined under atropine, when hypermetropic astigmatism was found. Glasses were therefore ordered, and six weeks later the inflammation was considerably reduced. A mercurial ointment was now substituted for the boracic, and a month later the inflammation had quite resolved.

Phlyctenular Conjunctivitis.

Phlyctenular ophthalmia, also called *eczematous conjunctivitis* or *lymphatic conjunctivitis*, is a condition occasionally seen in adults, but most frequently in the children of the artisan class, most of them either definitely tuberculous or showing the so-called strumous diathesis, but in those cases at this hospital in which the opsonic index for tubercle was taken it was found to be normal. Many of these children suffer from tuberculous glands in the neck, and there is frequently a family history of consumption. Coming to the individual case, we usually find that the child spends most of her time indoors, sleeps in a room with several others, ventilation at night is not approved of, and frequently she and soap and water are not on the best of terms. The food these children get is not always the most nourishing; they drink quantities of tea but very little milk, and fat in its various forms they eschew. No definite bacillus has yet been indicated as the cause of phlyctenular ophthalmia, though several have been found. The phlyctenule appears as a small elevation on the limbus conjunctivae usually, and consists of a round-celled infiltration situated immediately beneath the epithelium, which is raised over it and thinned; the invading cells consist of uninuclear and multinuclear leucocytes, small at the periphery but increasing in size towards the centre of the nodule; giant cells have been found by Leber³ and Wintersteiner. It thus commences as a solid nodule, from which the surface epithelium and part of the nodule, having undergone necrosis, are cast off, thus forming a superficial ulcer. Von Michel,⁴ however, states that vesicles and even pustules are actually formed, and the ulcer results from necrosis of their outer wall. The actual cause of the phlyctenula is thought to be the reaction of that part of the tissue to the toxins of the tubercle bacillus, and it is ascribed to an endogenous, as opposed to an ectogenous, origin. The symptoms vary in severity considerably; subjectively there is photophobia, frequently very marked, as in case L. J. mentioned below, where there was so much blepharospasm that it was with the utmost difficulty I was able to examine the condition of her eyes. Lacrimation may be more or less profuse, but there is no muco-purulent secretion, as a rule, so the lids do not stick together in the morning; usually the child keeps her hand or a handkerchief over her eyes, stays at home and remains indoors, and preferably in a dark corner. Objectively a small red projection is seen on the limbus conjunctivae surrounded by a zone of injected conjunctival vessels, occasionally a yellowish point can be seen in the centre of the red projection; the nodule may be a few millimetres away from the limbus, or it may be actually on the cornea. Instead of one phlyctenula there may be several minute ones (miliary phlyctenulae) around the edge of the cornea, or several larger ones on the limbus. These elevations break down and form ulcers, which usually heal in the course of a week or two, the patch of conjunctivitis resolving at the same time, and the epithelium growing over the ulcer, no trace of it is left. But this is followed by a subsequent attack, perhaps before the previous one has quite cleared up, or shortly after. These attacks recur for some years, sometimes till adult age, thus making the disease trying to the patient and practitioner alike. In more severe forms, where there are several phlyctenulae on the conjunctiva or on the cornea, each attack is much prolonged, and is much more difficult to treat. The case of L. J. is an example. She has been under constant treatment for some months, both as an in-patient and as an out-patient, and though much improved she is not quite well. The corneal complications I do not intend to discuss to-day.

The treatment of this condition must be general as well as local, therefore one advises the child to be out of doors all day; in a severe case one prescribes dark glasses, to counteract the photophobia, plain, wholesome food, plenty of milk and fat in some form or other, and the administration of cod-liver oil, locally frequent irrigation of the eye with warm boracic lotion, and the application of yellow oxide of mercury ointment. If the case is severe, it is better to content oneself with boracic ointment at first till the severity of the attack has diminished a little. These measures are usually quite sufficient to bring about a cure. If the cornea is involved, atropine must be instilled in addition.

M. C., aged 13, came complaining of sore eyes on and off for

the past two years, in spite of treatment. Six years ago the eyes were similarly affected. The present attack has lasted for a month; the child keeps indoors all day; there is marked conjunctivitis and photophobia, but no rhinorrhoea. There is no family history of tubercle, but of ten stillborn children. The eyes showed large phlyctenulae. She was treated in the usual way, and recovery was complete in a few days.

A. C. came with all the symptoms of a severe chronic catarrhal conjunctivitis, complicated by the presence of a septic ulcer on the left cornea. She gave a history of sore eyes for the previous year, but they had probably been in this condition for a longer period, as most of the cilia were missing, and some of those present were distorted. She was treated with boracic lotion, atropine, and fomentations, with the result that in three weeks the ulcer was healed and the conjunctivitis much lessened, but then some phlyctenular ulcers were seen on the outer side of the limbus of the left eye, thus showing the nature of the previous ulcer. A week later these ulcers, three in number, were markedly raised up from the surface of the conjunctiva and gave the appearance of tubercles rather than phlyctenulae. The treatment as indicated for this condition was continued. A week later these ulcers and swelling had resolved, but several miliary phlyctenular ulcers were now seen on the inner side of the cornea of the same eye. The treatment was persevered with, and the whole condition of the eyes vastly improved. A month later the refraction was examined under atropine, when compound hypermetropic astigmatism was found. Glasses were ordered, and up to the present her eyes have kept very free from inflammation.

L. J. came to hospital last year complaining of sore eyes of some considerable duration; she had intense photophobia and lacrymation; the blepharospasm was so marked that it was with great difficulty that I was able to inspect the cornea, even with retractors, and a nurse to hold the child. There was marked injection of the palpebral and ocular conjunctiva, and an ulcer on each cornea; she was treated without effect by ordinary measures for three weeks as an out-patient, then for the next month she became an in-patient, where the treatment, combined with cleanliness, fresh air, and good food, had a most beneficial effect in reducing the conjunctivitis and the accompanying photophobia and lacrymation; the corneal ulcer healed also. Then she was discharged, wearing dark glasses, owing to there still being some photophobia. Three weeks later she returned with the symptoms almost as marked, as in the first instance, and also a large granulating ulcer on the left cornea. Again out-patient treatment for nearly three weeks made very slight improvement, so she was admitted, but even then the condition resisted obstinately all our remedies, both local and general; she was given cod-liver oil, syrup of phosphate of iron, syrup of iodide of iron, and virol, alternately with no benefit; locally, atropine, both in solution and in ointment, was applied, hot and cold bathing, dionine by itself and in combination with the previous drug, but all to no purpose; finally, adrenalin solution was applied by itself; this turned the scale, and in a fortnight the eyes improved considerably, so that after two months' sojourn in the hospital it was possible to send her to a convalescent home; now she has very little photophobia, no lacrymation, in fact is almost well, but is still using dionine for the corneal nebulae.

Ophthalmia Neonatorum.

This is a purulent type of conjunctivitis found in the newborn, in which the conjunctiva shows a marked papillary development, and in which there is seldom any signs of scarring on recovery. The cause of this complaint in the great majority of instances is that micrococcus described by Nisser in 1879, and known as the *Diplococcus gonorrhoeae*; it is easily stained with methylene blue, and is decolorized by Gram's method. This micrococcus is unique in being able to penetrate intact epithelium, hence the importance of early and careful treatment. The other micro-organisms concerned are the pneumococci, streptococci, *Bacterium coli*, and others. The usual mode of infection is that during the birth of the child some vaginal secretion gets into the palpebral sacs, but definite cases of ante partum infection have been reported at times, and recently by Sidney Stephenson and Rosa Ford⁵ and by G. D. Robinson,⁶ in some of which apparently the infection took place through intact membranes.

The symptoms commence on the second or third day, rarely on the fourth; the lids become swollen, and may be markedly oedematous, there is inflammation of both palpebral and scleral conjunctiva, usually some chemosis, but not, as a rule, marked; there is free purulent discharge. On examining a case one usually notices the swollen lids glued together by a yellowish dried discharge adhering to them; on separating them a quantity of the discharge wells up from the palpebral sacs, the cornea is clear at first, but in untreated cases it is soon attacked. The treatment consists in the main in cleansing the palpebral sacs, and keeping them free from collections of the discharge. A useful lotion to use is 1 in 5,000

mercury perchloride, but it must be noted that one does not depend on the antiseptic properties of the lotion so much as on the mechanical effect of continually irrigating the eyes; this should be done every hour, or two at the least; then every day one performs savonnage with 2 per cent. silver nitrate. In this complaint prophylaxis is of the utmost importance. The majority of pregnant women have a vaginal catarrh, so antiseptic injections, immediately before parturition form the first step, then after the child is born the closed lids are wiped with a clean rag, and then after its first bath the eyes are carefully cleansed with boracic lotion, and then a drop of 2 per cent. silver nitrate solution is dropped on to each eye; this is the method advocated by Credé, who reduced the percentage of cases in Leipsig Lying-in Asylum from 10.8 to 0.1 or 0.2.

N. F., aged 14 days, was brought to hospital on account of a cold in her eyes, which did not get well. There was free purulent discharge; the lids were not much swollen; both palpebral and ocular conjunctiva were markedly injected. In the right eye the cornea was clear, but in the left there was a large central ulcer on the cornea, which had perforated, and the eye was already lost, being in a condition of panophthalmitis. The eyes were treated as indicated above, and now the conjunctivitis has quite resolved. The right eye is quite clear and well, but the left eye, although the conjunctivitis has resolved, is in a state of phthisis bulbi and is rapidly shrinking, there being very little sign of the cornea left.

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A CRITICAL STUDY OF ORGANIC PREPARATIONS OF SILVER IN THE TREATMENT OF CONJUNCTIVITIS.

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SINCE the introduction of argyrol and protargol there has been among clinical observers a great difference of opinion regarding their efficacy in diseases of the conjunctiva. Many have described them as being superior to silver nitrate; but others, like Dr. Pooley of New York, have regarded them as "bland, harmless, and inefficient."¹

During the past year a series of experiments have been performed with these preparations and with silver nitrate to ascertain their relative bactericidal powers. One realizes that in a laboratory it is impossible to reproduce exactly the conditions found in Nature; but as the same methods were used with each substance the results have at least a comparative value. The organism used was *Staphylococcus pyogenes aureus*, because it was easy to identify and because it gave results that were remarkable for their consistency. A small number of experiments were performed with the *Streptococcus pyogenes brevis*, the pneumococcus, and the gonococcus, but the results obtained were not nearly so consistent as those obtained with the *Staphylococcus pyogenes aureus*.

Quantities of argyrol and protargol were bought from a wholesale chemist and were submitted to a gravimetric analysis. The percentage of silver was ascertained by incinerating the substance, heating with nitric acid, dissolving in water, and then precipitating the silver with hydrochloric acid and weighing the precipitate. As a result of two estimations with each preparation, it was found that argyrol contained 17.01 per cent., and protargol 7.03 per cent. of silver. These figures are to be compared with 68.6 per cent. of silver present in silver nitrate. The manufacturers state that these preparations deteriorate when kept long in solution. We had noticed that bottles in which the solutions had been kept for some weeks gradually acquired a coating of silver oxide. To avoid any errors from faulty solution or from deterioration the solutions were carefully made according to the methods described by the manufacturers, were kept in dark glass bottles, and were always used before the third day.

An emulsion was made of a three days' growth on agar-agar of *Staphylococcus pyogenes aureus*, and was then filtered