Pneumococcus conjunctivitis / by Fred T. Tooke.

With kind regards. 36.
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Of the many and varied forms of an acute conjunctivitis referable to a specific micro-organism, none perhaps is more prevalent than that produced by the pneumococcus. This statement may be asserted with additional emphasis when one considers the outbreak, not only of isolated cases but of frequent epidemics during the early spring; the very unfavourable climatic conditions frequently induce colds of various kinds which play such an important role as a coincident factor in an outbreak of conjunctivitis of this kind.

The earliest recognition of the specfic form of conjunctival inflammation attributable to the organism under discussion is credited to Gasparrini, who noted the pneumococci in a case of hypopion keratitis in 1893. Gasparrini was subsequently able to produce a pneumococcus conjunctivitis in rabbits by inoculation. In 1894, one year after Gasparrini's observations, Morax and Parinaud described a particular form of conjunctivitis in the new-born as a monolateral, benign, but occasionally stubborn affection, with marked lacrymation and contemporaneous rhinitis. Lacrymal stenosis was frequently present at the same time. In Parinaud's opinion the exciting factor proceeded either from the nose or from the vagina.

Morax noticed a very delicate false membrane in his earliest cases in children under two years of age, but lacrymation did not as a rule occur. He further noticed that the disease would disappear in the course of a few days, and, as frequently only one eye was affected, he regarded the disease as non-contagious.

In 1896 Gasparrini and Axenfeld remarked independently that the disease could be recognised at different periods of life and that nearly always both eyes were affected; the latter reported two distinct epidemics. Gasparrini stated as his opinion that pneumococcus conjunctivitis was contagious, but Axenfeld considered that this statement could hardly hold for every individual. They both agreed that the clinical picture varied, the former stating that some manifestations were practically indistinguishable from that form of conjunctivitis produced by the Koch-Weeks bacillus; the latter recorded that in many instances pneumococcus conjunctivitis was peculiar and distinct.

Additional emphasis was given to the observations of these authorities by the experimental work of Pichler, Gifford and Veasy.

The presence of the disease has been recognised and recorded principally in the more northern countries and outbreaks of epidemics occur generally in the colder seasons of the year, principally in the early spring. It has been further observed that different localities and different seasons of the year produce different results and Gasparrini and Gifford seem to have noted much more intense outbreaks than other writers. It is not necessary to draw attention to the fact that pneumococcus conjunctivitis only occurs occasionally in pneumonia; in fact, very few isolated cases of a coincidence of the two diseases have been recorded. A severe cold in the head producing a temporary stagnation at the nasal duct may be a prodromal factor and responsible for the subsquent regurgitation of micro-organisms from the lachrymal channels. It has also been pointed out that this form of disease may occur with measles.

The disease is essentially an acute inflammation, one eye being rapidly affected after the other, in the form of a very acute catarrh; yet the intensity and duration of the attack may vary considerably. Some cases are very pronounced, almost bordering upon a type of blenorrhœa, showing marked injection and swelling with considerable purulent discharge; while others demonstrate quite a mild type of disease which is limited to a course of few days duration. Consequently, one cannot say that it is recognisable by a definite and distinct clinical picture.

Two cases seen by me comparatively recently manifest not only a diversity in the clinical manifestations of the disease but in the severity of the type of inflammation present.

Case A.—An elderly man had been admitted to the hospital for the extraction of a cataract. Extrinsically the eye appeared healthy in every respect but to insure additional safety a culture plate, as well as a smear preparation, was made from the conjunctiva; no bacteria were found. As an additional safe-guard the lachrymal sac was syringed out with saline solution and the duct found to be patent. The usual operation for cataract extraction was performed and for the first twenty-four hours the patient's condition was in every way satisfactory. The following day, after complaining of a burning sensation and pain in the eye, pus was found on the dressing and the conjunctiva was seen to be distinctly reddened; evidence of early necrosis appeared along the line of the corneal incision. A smear preparation of the conjunctival secretion was made after Gram's procedure, which re-

vealed quantities of pneumococci. Römer's anti-pneumococcic serum was administered immediately but the day following the progress of the disease had not been stayed and pus was in the anterior chamber. Local treatment and the employment of Römer's serum failed to check the disease, so that in four days the condition had proceeded to one of panophthalmitis with the usual results.

Case B.—Admitted to hospital suffering from an acute keratoiritis of the right eye. The patient's general health was good but shortly after her admission she complained of pain and lachrymation in the formerly healthy eye. The onset was markedly acute, to such a degree that, in twenty-fours hours the lids were tremendously infiltrated and the most pronounced chemosis conjunctivæ was present so that the cornea could scarcely be seen. A rather profuse muco-purulent discharge was emitted from the palpebral fissure and examination of it showed pneumococci in large quantities. Iced applications of boracic acid and biborate of soda were applied to the lids and three or four days later all evidence of superficial inflammation had disappeared.

These two cases are cited merely to illustrate the remarkable result which may follow an apparently benign infection of the pneumococcus with a coincident corneal wound; while a very acute attack with profound superficial disturbance may completely disappear in the course of a few days if the corneal epithelium has remained intact.

An ordinary case of moderate intensity would appear somewhat as follows:—One first notices a rosy-red œdema of the lid margins, particularly of the upper, and Morax regards this as characteristic; there is a rapid increase of the redness of the conjunctiva with moderate swelling and an occasional superficial false membrane formation so that at the crisis of the disease a profuse watery secretion containing a few purulent particles may be emitted between the lids and a marked redness of the bulbar conjunctiva be present, with an occasional phlyctænular formation at the limbus. One may occasionally notice tiny hæmorrhages in the bulbar conjunctiva particularly in that portion covered by the upper lid; these hæmorrhages assume a yellowish red colour and disappear during the process of resolution of the disease. This picture may pursue a critical course and the rapid disappearance of symptoms may follow in a short time after the crisis when the exciting cocci will disappear rapidly; the so-called Xerosis bacillus and the staphylococcus alone remaining. This condition is frequently noted in the new-born.

While a very similar picture of acute inflammation may be produced by the Koch-Weeks bacillus yet the critical course of the disease with

sudden resolution and the arrest of symptoms independent of steady treament of the conjunctiva characterises the pneumococcus as the responsible exciting agent. The very frequent association of a distinct coryza is not characteristic in a Koch-Weeks bacillus infection to the same extent. If we are to accept typical cases of the disease, these appear to run more in epidemics than as isolated cases.

Instances have been remarked where children have seemed to be selected in an outbreak of the disease although adults exposed to precisely the same degree of contamination have escaped, These outbreaks, so frequently observed in epidemic form among children, do not appear to have been noticed among adults unlike the Koch-Weeks inflammation, only isolated cases appearing as a general rule. An outbreak in adults, if we are to regard it as such, is generally of a very mild nature compared to that seen in children and can hardly be considered as an epidemic contrasted with the epidemics of Koch-Weeks conjunctivitis. It is consequently quite possible that in a large proportion of adults the conjunctiva possesses a certain power of resistance to the pneumococcus not found in chilren.

I have already remarked that a light superficial false membrane may be formed on the palpebral conjunctiva; some types occasionally are more severe and may simulate the croupous or diphtheritic forms. An iritis may be produced by resorption of the toxines of the pneumococcus without there being of necessity a corneal involvement. Gasparrini, whose cases appear to have been particularly severe, as well as Rymowitsch, has remarked upon this fact. This iritis may remain after all the indications of the conjunctivitis have subsided.

Although an infection of the cornea by the pneumococcus as an ulcus serpens will follow an insignificant abrasion of its protecting epithelium this complication fortunately seldom occurs where the corneal epithelium remains intact. In support of this statement Coppez has shown that in the intact cornea colonization of the bacteria in this tissue seldom occurs. The marked importance of the pneumococcus infection of the conjunctiva in the new-born has been commented upon by several authorities. The concensus of opinion points to the fact that this form of inflammation is of a benign nature, more so at least than that produced by the gonococcus. Cases of blenorrhœa neonatorum due to the pneumococcus are comparatively rarely seen. The existence of follicles in pneumococcus conjunctivitis is very occasionally noticed and when found in any quantity they can generally be attributed to causes other than the pneumococcus. Gasparrini and Ferri report cases where conditions of trachoma have been improved after a subsequent infection

by the pneumococcus; but Gifford and Junius have not been able to substantiate this optimistic view.

Inoculation of the disease into animals very seldom produces positive results and a reaction in rabbits has only occurred after scarification of the conjunctiva or after abrasion of the corneal epithelium. The results in man, however, as I have already stated, are very variable; the occurrence of epidemics with the demonstration of the pathogenic cocci is the best proof that the disease is one that is transmitted. Veasey and Gifford have produced the disease by installing a pure culture of the pneumococcus into the conjunctival sac. Gifford had no success at first with ærobic growths but with anærobic forms, conjunctivitis with flecks of secretion was present after an incubation of 24 hours. Halle observed the onset of the attack of conjunctivitis seven days after some discharge containing pneumococci had accidently found its way into the eye; on the other hand Axenfeld reports a series of eight cases, one a child, with negative findings. From the foregoing is deduced the fact that in addition to contact infection there is a distinct individual susceptibility; one must also consider the possibility that some secretions do not possess the same power of producing as others. From this inference we can thus account for many isolated or sporadic cases where, in spite of conditions of profuse discharge, contagion does not occur. The fact that adults remain uninfected in many epidemics endorses this conclusion. That many foster the pneumococcus in a normal conjunctiva and tear sac where little or no reaction is present is admitted; and inflammation of the conjunctiva due to an increased virulence of this micro-organism or the diminution of the patient's powers of resistance, can readily account for the subsequent outbreak. The ordinary chill on taking cold is frequently the cause to which is to be attributed such formation of inflammation.

To what degree immunity to the pneumococcus can be produced in the conjunctiva, has not been as yet satisfactorily estimated. Gifford after inoculating himself successfully found the conjunctiva apparently immune one week later.

During the early stages and height of the attack pneumococci are generally found in large quantities, particularly in small particles of pus from the discharge; the bacteria may appear free or they may be intracellular. They vary from those exhaled from the lungs in that the capsule of the conjunctival form is less distinct. When many round, short diplococci appear one is generally able to recognise numbers of a larger form as well; staining after Gram's procedure differentiates

them from other diplococci. As soon as the inflammation subsides the typical pneumococci disappear while the so-called Xerosis bacilli and staphylococci may remain in varying numbers. A mixed infection is not frequently the case and at the crisis of an attack a pure culture of pneumococci is generally found.

Examining, microscopically, a section of the conjunctiva affected by this form of inflammation, one finds a diffuse infiltration of leucocytes through the section while pneumococci can be detected in the epithelium and in the more superficial layers of the mucosa.

Culture growths show a characteristic form, and the disposition towards chain formation is apparent, sometimes confusing them with the streptococcus growth. A microscopical examination of a smear preparation usually solves the problem; the diplococcus is generally seen a pair of enclosed cocci some of which are of larger size than others. The typical shape, or that most frequently seen is somewhat pointed at the poles, or lanceolate, and this characteristic is particularly well seen in smear preparations. One may also observe shorter and rounder diplococci with isolated short, plump chains, as well as short bacillus-like growths and involution forms. The capsule misleads one in considering them to be as large as the staphylococci or the streptococci. This capsule is best seen in a preparation of Lœffler's aniline blue.

Pneumococci grow only in high temperatures, over 22°C., best at 35°C.; they become weak at 40°C. They require media which are mildly alkaline, yet different growths seem to vary in this respect. The media should be moist and not too old; on agar and blood serum one notices glassy, bright, opalescent colonies which are round, resembling tiny droplets. They are very small and not very much elevated or sharply defined. After a few days' growth these colonies disappear or are indistinct. Some colonies of pneumococci growing on a very moist surface have to be examined with the aid of a magnifying glass in order to be detected. Römer had advocated rabbit's blood serum, to which one-third glycerin has been added, as the best culture medium upon which to grow the pneumococcus.

These bacteria from the conjunctiva seem to be more difficult to grow than those obtained from the sputum of pneumonia; the best media are carefully prepared blood serum and agar. The cultures generally die in the incubator in a few days; anærobic growths generally last a little longer and their power of virulence is also retained, as I have already stated in Gifford's conclusions. Bouillon growths produce a slight turbidity which quickly clears up. Growths from the conjunctiva

on media die rather more quickly when placed on ice. Microscopical preparations made from media frequently show exaggerated forms of the bacteria as seen in smear preparations from the discharge; the arrangement of the cocci is often such as to simulate streptococci, the single organisms being shorter and rounder and arranged as short chains, these being included in the enveloping capsule. Such forms resemble the so-called "streptococcus mucosus" very closely.

The question of the identity of the micro-organisms last mentioned is, however, still an open one; some, as Wirtz, claiming it to be a distinct and separate form of bacterial growth, others, as Rupprecht, holding that its identity as such has not been proven and that in all probability it is merely a special form of the pneumococcus. In any case it is found extremely seldom as a distinct growth in the conjunctival secretion.

As the disease is a self-limited type of inflammation, the treatment must be essentially an expectant one; the secretion should be carefully irrigated from the conjunctiva and palpebral fisssures by bland alkaline solutions, as boracic acid and biborate of soda. Iced compresses to the lids are generally grateful to the patient and well borne by the eye. Any evidence of early ulceration of the cornea should be treated with the actual cautery.

The concensus of opinion points to the fact that Römer's anti-pneumococcic serum has little or no power in allaying the progress of the disease when once the pathogenic microbes have been demonstrated and evidence of inflammatory reaction has appeared.

REFERENCES.

Axenfeld.—Ergenbnisse der path. Anatomie (Lubarsch-Ostertag), 1894-1900.

Vortrag im arztl. Verein, Marburg, 1895.

Verhandl. der Ophth. Gesellsch., Heidelberg, 1896.

Deutsche med. Wochenschrift, 1898 Nr 1.

Die Bakteriologie in der Augenheilkunde, 1907.

Coppez.—Verhandlungen des ix internat. ophthal. Congress in Utrecht, 1899, S. 72.

Cuénod.—Comptes rendus du Congrès français d'ophthal. 1895, p. 534.

Ferri.—Annal d'Ottalm, 1896, t. 25, p. 472.

Gasparrini.—Annal d'Ottalm. 1893, Vol. 26, p.

Atté della R. Accademia dei fisiocritici di Siena, 1894, Vol. 5.

Ann. d'Ottalm., 1896, t. 25.

Gifford.—Archives of Ophthalmology, 1896, Vol. 25, p. 314.

Gonin.—Révue med. de la Suisse Romande, 1899, Fevr. and Mars.

Groenouw.—Archiv. f. Ophthalmologie, 1900, Bd. 50.

Hallé.—Ann. d'Ocul., 1900, t. 123, p. 200.

Hertel.—Archiv. f. Ophthalmologie, 1902, Bd. 53, 3, p. 502.

Lawson.—British Medical Journal, 1898, June.

Lundsgaard.—Inaug. Dissert. Kopenhagen, 1900, S. 17.
Morax.—Recherches bacter, sur l'étiol. des conjonctivitis aiguës. These de Paris, 1894.
Maladies de la Conjunctive. Encycl. d'ophthal. 1905, Bd. 5.
Morax & Petite.—Annal d'Ocul., 1898, Sept.
Parinaud.—Ann. d'Ocul., 1894, Dec.
Petit.—Annal d'Ocul., 1901, t. 126, p. 186.
Pollock.—Trans. of Ophthalmological Soc. of United Kingdom, 1905.
Romer.—Archiv. f. Ophthal., 1903.
Archiv. f. Augenheilk., 1905.
Bericht der ophth. Gesellschaft, Heidelberg, 1905.
Saemisch.—2 Aufl. des Handbuches 1905, S. 47, "Bindehaut."
Uhthoff and Axenfeld.—Archiv. f. Ophthal., 1896, Bd. 42.
Usher and Fraser.—Royal London Ophthal. Hospital Reports, June, 1906.
Veasy and DeSchweinitz.—Ophthal., Review, 1899, S. 354.
Wirtz.—Klin. Monatsbl. f. Augenheilk., Bd. 2, Oct. 1906.
Charles and Papenheimer.—Journal of experiment. Med., 1905, Vol. vii, No. 5.