The blocks of the colour illustration have kindly been lent by Messrs. Wm. Heinemann, at the request of Mr. R. Lindsay Rea, in the second edition of whose "Neuro-ophthalmology" the picture has recently been published.

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EPIDEMIC SUPERFICIAL PUNCTATE KERATITIS IN MALAYA

An account based on observations of Superficial Punctate
Keratitis which occurred in Selangor, one of the
Federated Malay States, from 1935-38

BY

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SUPERFICIAL punctate keratitis was not recognised in this country prior to 1934, during which year the writer met with two cases, one in a European female, and the other in a Tamil labourer. In

the last quarter of 1935, however, a considerable number of cases occurred chiefly amongst school children; but, in the beginning of 1936 the disease broke out in epidemic form and continued throughout the years 1936, 1937 and 1938. It is still to be seen in considerable numbers to this day.

Superficial punctate keratitis was first described by Fuchs in 1889. Herbert of Bombay reported the occurrence of a fair number of cases during the winter of 1900-1901. In 1920 Kirkpatrick reported an epidemic in Madras of what he described as macular keratitis, which has been recognised since as superficial punctate keratitis. Again, in May 1928 superficial punctate keratitis appeared in epidemic form in Madras and lasted for two years. A detailed account of this was given by Wright in 1930. Kirwan in Calcutta also reported on an epidemic which occurred during 1931 and 1932.

The present paper is based on observations of 3,521 cases which occurred in epidemic form from 1935 to 1938 in Kuala Lumpur.

Clinical Features

Superficial punctate keratitis, so-called for want of a more appropriate name, is an ocular disease whose chief characteristic is an acute inflammation of the conjunctiva starting in the region of the outer canthus, succeeded by a sensation as if there were a foreign body under the lids. The onset appears to be sudden, varying from a few hours to one or two days. The premonitory symptoms seem to be some discomfort, or pain, about the region of the temple adjoining the outer canthus of the eye. This pain spreads to the skin over the lids and is accompanied by lacrimation. Within a few hours the eye becomes irritable, and the patient probably rubs it; very soon the eye presents the picture of an acute conjunctivitis. Invariably one eye is affected first; this may be followed in a day or two by similar symptoms in the other eye. The clinical features are very characteristic. There is photophobia and lacrimation, the lids are swollen, particularly in the outer thirds in the early stages, the swelling is more marked in the upper lid and less so in the lower; but the latter presents a baggy appearance as though there were lymph stasis in the subcutaneous tissues of the lid (Plate I). In severe cases the face on the affected side appeared as though the patient was stung by a wasp—the swelling of the skin presented such an appearance (Fig. 1). The conjunctiva of the lids and particularly the conjunctiva over the globe between the cornea and outer angle is inflamed, followed by chemosis which is severe about the lateral aspect of the cornea and may spread round and involve the entire bulbar conjunctiva (Plate I). In a few instances the palpebral

PLATE I. *Clinical appearance.*

In A and B, the left eye was first affected, note the swelling of the upper lid and the baggy appearance of the lower. Also the chemosis of the bulbar conjunctiva along the palpebral fissure, specially in C where the right eye was primarily affected. In all, A, B and C, it will be seen, the eye secondarily affected shows the above signs less prominently.

conjunctiva of the upper lid corresponding to the area of the lacrimal gland showed prominent granulations. In severe cases the whole of the palpebral conjunctiva presents a granular appearance. Frequently, adjoining the outer limbus one or two areas of punctate haemorrhages may be seen, giving one the impression that the eye has been stung by some insect. The chemosis of the conjunctiva may be so great as to form a mound 3-5 mm. high along the limbus and engulf, as it were, the cornea (Fig. 2). Along the limbus in severe cases elevations may appear resembling a phlyctenule (Fig. 1a).

In the great majority of the cases there is hardly any mucoid or purulent discharge; but in some instances the patients say that the lids are stuck together on waking in the morning, and in such cases creamy coloured flakes of mucus may be seen along the lid margin. The skin over the temple and face feels warm, and almost invariably the pre-auricular lymph gland becomes swollen and tender very soon after the onset of the conjunctival disturbance. Occasionally the sub-maxillary and very rarely the cervical glands may become involved. The enlargement of the lymph glands is considerable and they may attain the size of a coffee bean. Their subsidence follows the abatement of the conjunctival disturbance.

FIG. 1.

FIG. 1a.

FIG. 2.

The corneal surface, in cases where there is severe conjunctival inflammation, presents a dulled appearance which may go on to distinct haziness, and may be followed in many cases by spots of keratitis varying greatly in size and distribution. In mild cases the cornea does not get involved in any way and sight is not interfered with. But in others almost from the commencement there is some dimness of vision. In such cases there is perhaps what may be described as cloudiness of the corneal epithelium, which is later followed by superficial punctate keratitis, each spot varying in size from a pin point to circular areas varying from 3-5 mm. These are generally very superficial, but in very severe cases may extend to the substantia propria and even to Descemet's membrane and the uvea. The distribution of the spots is erratic. In some cases the cornea is uniformly studded with these spots, which literally cover the whole corneal surface (Plate II); in others a few scattered spots appear on the cornea close to the limbus in any of its quadrants; more frequently, they may appear only in the centre, while the periphery is free. The spots, which are often discrete at first, may coalesce and develop into large nebulae. They are greyish in colour and are often visible to the naked eye. In only a few cases in my series was there noted any erosion or raising of the epithelium. The corneal affection is not prominent except

in severe cases and then not until some time after the conjunctival inflammation has started. The extent and severity of the corneal affection would seem to depend on the severity or otherwise of the conjunctival inflammation.

PLATE II.

A, B, C and D depict how the punctate spots on cornea vary in size, distribution and depth. In all these the left eye was primarily affected.

The ocular condition does not seem to affect the general constitution of the patient in any way although some patients reported they felt as though they had a slight afternoon temperature (99.6° F.) at the onset. In the case of a few infants and children a definite

rise of temperature from 100°-101° F. was recorded. In some instances there appeared to be what may be described as a mild nasal coryza which may be the result of excessive lacrimation or the result of an associated catarrh of the respiratory tract. There is, of course, the discomfort and disability, which are considerable. The inflammatory mischief in the eye may subside in mild cases within a week or ten days; but in severe cases it may last from 2-12 weeks. The corneal affection, when it does occur, takes even longer, and may last several weeks, causing considerable diminution of vision. A few of my patients who were involved in the early stages of the epidemic in 1935 were seen to have the spots on the cornea during the Spring of 1937. Apart from this the individual does not appear to suffer any other disability.

Differential Diagnosis

It is important to differentiate superficial punctate keratitis from simple conjunctivitis. In the beginning, when there is no corneal lesion a negative smear and a palpable tender pre-auricular gland and the characteristic appearance of the eye may be presumptive evidence of superficial punctate keratitis.

Herpes febrilis is another condition to be differentiated from superficial punctate keratitis. In herpes febrilis blisters may occur on the cornea. Associated with this there are often inflammatory signs in the alimentary or respiratory tract. But in the course of this epidemic we have had no single case of vesiculation or blister on the cornea, which appear to have been not infrequent in the Calcutta epidemic reported by Kirwan.

Treatment

The disease when seen early, easily responded to treatment by ordinary hygienic and curative measures. Hot fomentations, warm boric or saline irrigation, argyrol or protargol in the form of drops followed by the application of weak yellow oxide of mercury ointment or borovaseline with a pad or a shield over the eye generally suffices in dealing with most cases; but in cases seen late with complications, treatment must be directed towards the relief of the particular complication concerned. In all cases which show the slightest corneal irritation as evidenced by photophobia, lacrymation, and spasm of the lids, and, of course, in cases which show added signs of iritis, which is infrequent, it is well to insert some $\frac{1}{2}$ per cent. atropine ointment preceded by either hot or cold compresses as may appear to be indicated. Later, in dealing with the spots a 5 per cent. dionin ointment is an invaluable aid in clearing the corneal scars.

SUPERFICIAL PUNCTATE KERATO-CONJUNCTIVITIS
TABLE I

Incidence and Rainfall per month

Year	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1935 ...	35	45	46	—	—	—	—	—	—	—	—	—	—	—	—	126
1936 ...	—	—	—	49	36	37	89	119	101	109	119	100	108	88	80	1035
1937 ...	—	—	—	50	35	62	77	59	75	128	105	89	167	128	88	1063
1938 ...	—	—	—	83	121	103	117	120	84	126	151	107	100	104	81	1297
Total ...	35	45	46	182	192	202	283	298	260	363	375	296	375	320	249	3521
Rainfall— inches																
1935 ...	12 65	14 810	10 888	—	—	—	—	—	—	—	—	—	—	—	—	...
1936 ...	—	—	—	5 110	7 165	13 310	12 393	17 625	3 905	1 753	5 040	8 521	9 915	7 407	7 585	...
1937 ...	—	—	—	8 520	11 93	12 376	20 042	5 265	1 485	2 835	7 35	10 284	12 880	14 775	7 855	...
1938 ...	—	—	—	6 590	6 420	9 085	9 020	5 561	2 435	7 157	5 785	8 777	8 630	5 235	5 1890	...

NATIONALITY AND SEX

TABLE II

Sex	Nationalities						Total
	European	Eurasian	Chinese	Indian	Malay	Others	
Males ...	9	41	1265	560	480	11	2366
Females ...	2	20	881	135	110	7	1155
Total ...	11	61	2146	695	590	18	3521

AGE INCIDENCE

TABLE III

	months	years									
	0-12	1-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	Total
Total	76	325	499	890	872	518	218	92	26	5	3521

Aetiology

As to aetiology there is little to be said, as this is obscure. None of the smears examined by us from 355 fresh cases revealed any micro-organisms. Later, we sought the assistance of Dr. Green, the Bacteriologist of the Institute for Medical Research, who very kindly undertook bacteriological investigation. The results were negative. We attempted to transfer the disease from fresh cases to the conjunctiva of eyes that were healthy except for blindness from optic atrophy. Of the six patients who submitted to this experiment, four developed the typical signs of moderately severe conjunctivitis with chemosis and enlargement of the pre-auricular gland and swelling and puffiness of the eyelids within 12 to 36 hours. All the symptoms cleared within 6 to 8 days, the remaining two showed signs of a slight conjunctival irritation which subsided in 24 to 36 hours. We also tried to transfer the disease from two of the four successful cases to two others who developed conjunctivitis of a mild degree which cleared up without any treatment in a day or two. In only one of the four successful cases was the cornea involved. This patient showed numerous punctate spots reaching to Bowman's membrane. This disease appears to be

infectious and contagious. Whole families consisting of many members were affected one after the other. In a middle class European family, a daughter aged 14 developed the disease first in one eye and then in the other. During her convalescence, the mother developed it likewise, followed by the father, who also had one eye affected first followed by the other. In the case of the mother and daughter the cornea was not involved although the conjunctival inflammation was fairly severe and took 3-4 weeks to subside. But in the case of the father in whom the inflammation of the conjunctiva was very severe, the cornea in both eyes showed the typical punctate keratitis, which was uniformly distributed throughout the corneal surface. This patient was under treatment for about 3 months, when, at the end of this period he went on furlough to Europe, he still had some conjunctivitis; and the spots of keratitis, though they had disappeared in great numbers, still appeared as though it would be some time before they finally cleared up.

Superficial punctate keratitis is not confined to any particular race, class or age of the people of the community. It is not confined to any particular region of the country. All races and all classes of the people were equally affected. My youngest patient was an infant 10 days old—and the oldest was a man of 80 years of age. More than fifty per cent. of the cases occurred in those between 10 and 30 years of age. Patients came from all over Malaya. In many instances patients came in, long after they had had the "sore eye," for disturbance of vision caused by central punctate and macular keratitis. They seldom connected the "sore eye" with the disturbance of vision which followed.

Fuchs considered superficial punctate keratitis to be due to a form of chill which occurred during winter.

Herbert, of Bombay, thought it was due to some capsulated bacillus.

Kirkpatrick conjectured that the disease was parasitic or nutritional.

Wright described some inclusion bodies and thought the affection belonged to the herpetic group and was caused by a filter passing virus.

Kirwan found no inclusion bodies. He thought an exogenous toxin travelled along the nerve and caused the corneal trouble.

From our observations of the cases met with in this country we are led to believe that superficial punctate keratitis is caused by an exogenous infection. In the face of bacteriological negative findings the infecting agent is probably a virus. The intense local irritation, causing severe inflammation, serous and lymph stasis, and involvement of the lymph glands; the seat of the trouble almost invariably being located in that portion of the eye that is

most exposed, *i.e.*, the outer canthus; and the brunt of the inflammation being found along the outer palpebral fissure; the invariable involvement of one eye at first, are features that would appear to indicate that the infection is local and that it finds entry into the system by way of the conjunctiva or the muco-cutaneous junction along the palpebral fissure at the outer canthus. I venture to think that rubbing the corner of the eyes either by the bare fingers or by articles of toilet has something to do with the entry of the virus into the conjunctiva. The signs, and symptoms would appear to indicate that we are probably dealing with a virus of considerable toxicity.

Conclusion

In conclusion it might be useful to add that the designation "superficial punctate keratitis" or "keratitis diversiformis et uveitis anterior" would appear to be inappropriate as these do not define the primary condition, but serve to indicate its complication only. Our experience would seem to show that it is primarily a disease of the conjunctiva caused by an exogenous infection which according to its severity spreads to the lymphatic glands in one direction, and, in the other direction, to the adjacent tissues of the conjunctiva, involving the cornea and uvea, causing superficial or deep complications according to the depth to which the infection has travelled.

" ' Acute kerato-conjunctivitis of undefined origin ' occasionally becoming epidemic " would seem more aptly to describe this clinical condition.

Special Features

It is useful to record some of the special features of this affection which was recognised for the first time in this country in sporadic form in 1934 and assumed epidemic form in 1935-1938.

1. Onset fairly sudden sometimes a matter of a few hours.
2. Invariably one eye is affected at first; the left eye in 962 cases and the right in 853 cases were affected.
3. Cold weather and baths in pools appeared to bring about the onset and aggravate the symptoms.
4. The reaction in some individuals is so severe as to give one the impression that a violent irritant was injected into the conjunctiva and subcutaneous tissues of the orbital and peri-orbital areas.
5. The virulence of the reaction was often severe in the eye affected first, but occasionally worse in the fellow eye.
6. The susceptibility to infection is great in eyes that were convalescing after trauma, either surgical or otherwise. There

were also a few cases in which a patient having treatment for chronic trachoma (stage iii) developed this affection, which cleared up quickly without affecting the course of the trachomatous condition in any way.

7. Invariably the seat of trouble was the muco-cutaneous junction along the margin of the lids, or the bulbar conjunctiva adjoining the outer canthus along the palpebral fissure.

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INFECTION OF SPHENOIDAL SINUSES WITH SECONDARY AFFECTION OF THE EYES*

Causing in one detachment of the retinae in
both eyes, and in the other acute
optic neuritis of one eye

BY

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Case 1.—Mrs. C., aged 32 years. Wife of a doctor, first seen about June 22, 1937, complaining of a severe pain behind the right eye and across the forehead, and diffuse redness and swelling of the face. She had had the previous week a mild attack of cold, cough and fever, possibly influenza, which was treated with "home" remedies. She said she had been subject to "hay fever," i.e., rather long bouts of sneezing on waking in the mornings and occasionally at odd times in the day, for some years.

PERSONAL HISTORY.—No illness of any note. Had three children, eldest about six years old. All healthy.

FAMILY HISTORY.—Negative.

The eyes appeared normal, movements good. T.n. Fundi normal. Tenderness on pressure over the right eye.

She was given sod. salicyl. and ordered fomentations. The patient was seen two days later and her sight was much diminished

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