

Original Articles

OCULAR COMPLICATIONS IN
SMALLPOX*

By CAPTAIN K. SEN, M.B., D.O.M.S., F.R.C.S.E.

Honorary Ophthalmic Surgeon, Medical College Hospitals; Late Honorary Teacher in Ophthalmic Surgery; Honorary Ophthalmic Surgeon, Campbell Medical School and Hospitals, Calcutta

It is admitted that smallpox is one of the commonest causes of blindness in India, and specially so in Bengal, where the disease is endemic, and epidemics are of frequent occurrence every 3 or 5 years. In foreign literature, the following complications are mentioned: catarrhal conjunctivitis, conjunctival and corneal pustules, corneal ulcers, hypopyon ulcers causing dense leucomata, and vitiligo of the iris. 'Hypopyon ulcers of smallpox used to be of importance because of its prevalence in pre-vaccination days: it used to account for 35 per cent of all blindness, but now it is rare except in countries where smallpox is rife and nursing is poor' (Duke-Elder, 1937). No Indian records are available giving details of the cause of blindness in smallpox.

The study was undertaken in the Campbell Hospital during the period 1932-1939 with a view to finding out the causes of blindness in smallpox and the prevention of blindness, if possible. The study is divided into 4 parts:—

(1) Observations of pathological conditions of the eyes already blind due to smallpox amongst the outdoor cases, 1932-1935.

(2) Observations on cases of smallpox after they had developed ocular complications, 1933-1935.

(3) Observations on all cases of smallpox admitted into the hospital during the epidemic of 1936 (January to May).

These observations form the basis of this paper.

(4) Observations on all cases admitted into the hospital up to the epidemic of 1939 with special reference to the preventive measures adopted against blindness.

(1) Observations amongst outdoor cases,
1932-1935

Forty-three cases of blindness due to smallpox were observed. The blindness was due to (a) phthisis bulbi—9 cases, two were bilateral, and seven unilateral, (b) dense leucoma involving the whole of cornea—14 cases, three

were bilateral, and eleven unilateral, (c) dense leucoma with secondary glaucoma—6 cases, four unilateral and two bilateral, (d) leucoma with anterior synechia—6 cases, two bilateral, and four unilateral. All patients in the last group had some sight after separation of the anterior synechia and optical iridectomy. All these cases point towards corneal complications, primary or secondary.

(2) Observations amongst indoor cases,
1933-1935

During this period, methylene blue drops (1 per cent) were used as routine in all cases, and liquid paraffin drops in all unconscious or semi-conscious cases twice daily. The services of the ophthalmic surgeon were requisitioned after the development of some serious complications. It was striking to see large number of cases of muco-purulent conjunctivitis, corneal ulcer, hypopyon ulcer, and lagophthalmic keratitis. Many patients left the hospital cured of smallpox but blind in one or both eyes. It was observed that ocular complications were more common in the epidemic year of 1933 than in the endemic years of 1934 and 1935. The discharge from some cases of muco-purulent conjunctivitis were examined. On culture, the most common organisms found were *Staphylococcus albus*, *citreus* or *aureus*, Koch-Week's bacilli, diphtheroid bacilli, and very occasional streptococci and pneumococci. In every case of hypopyon ulcer where the lacrimal sac could be examined, there was regurgitation from the sac, but this examination was not possible in the majority of cases due to the eruption and swelling of the part. It was clear that the clue to the prevention of blindness was in the prevention of corneal ulcers.

At the end of 1935, preventive measures were adopted. For this purpose two trays were introduced. The surgeon's tray contained two Desmarre's lid elevators, two canaliculus dilators, and a small glass-stoppered phial of pure carbolic acid. The nurse's tray contained one large undine containing 1 in 15,000 oxycyanide of mercury lotion, one large pot of sterile boric ointment, argyrol drops 4 per cent and 10 per cent, and two glass rods to introduce the ointment. Oxycyanide of mercury lotion was selected to wash out the eyes as it was supposed to have some specific action against staphylococci. The following routine method was introduced:—

(a) On admission, the lacrimal sac was examined whenever possible. In all cases of diseased and doubtful lacrimal sacs, the puncta lacrimalis and parts of canaliculi were cauterized by the surgeon with pure carbolic acid by means of a canaliculus dilator.

(b) In all cases with conjunctival discharge, the eyes were washed out 3 times daily with the lotion from an undine and more frequently in serious cases as desired by the surgeon.

*[Paper condensed by editor. This work was done in the period before sulphonamides became available; these drugs may have markedly changed the situation.—
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(c) The routine use of either 4 per cent or 10 per cent argyrol drops according to the severity of the case in all cases of conjunctivitis was instituted.

(d) In every case of conjunctivitis, boric ointment was introduced twice daily morning and night so that the lids might not stick together.

It should be noted that this routine treatment aimed at isolating the infected lacrimal sacs, prevention and treatment of acute conjunctivitis, and the prevention of lagophthalmic keratitis.

(3) *Study of all cases of smallpox admitted into the hospital during the epidemic of 1936*

All observations in this paper were from the records of the cases during the months from January to May (see tables I and II). The preventive and curative work was done under the direct supervision of the ophthalmic surgeon. All cases are included except those who were admitted during afternoon and night and expired before the next morning. During the period, 1,929 cases were admitted, of which 236 had ocular complications; 185 cases were admitted with these, and

cases show growths of *Staphylococci albus* or *aureus* or a mixed growth' (Sen, 1935).

The more severe the disease the more are the ocular complications. The hæmorrhagic type is the most severe, but most of the patients died so quickly that they could not be examined for ocular complications. 4.7 per cent amongst those who were examined was a high figure considering the short period between the attack and death.

(4) *Ocular complications as observed in 236 cases*

In 185 of these, the complications were present before admission to hospital. In 51, however, the complications developed after admission. Of these, 19 showed smallpox vesicles and pustules, 5 showed phlyctenular keratitis and 7 showed sub-conjunctival hæmorrhages attributable to smallpox. In 20 of the 51 cases, the eye lesions were caused either by secondary infection or by keratomalacia and were therefore preventable. At the time this work was done however sulphonamides were not available.

The nature of the ocular complications of smallpox encountered in these 236 cases is in-

TABLE I
Incidence by month

	January	February	March	April	May	Total
Admissions	250	509	678	397	93	1,929
Ocular complications ..	21	39	118	49	9	236
PERCENTAGE ..	8.4	7.6	17.4	12.3	9.6	12.2

51 developed ocular complications in the hospital in spite of the preventive measures.

The worst months of the epidemic were February and March, but the worst months for the ocular complications were March and April. The epidemics of 1933 and 1939 showed a similar phenomenon. Probably this is due to an increase in the conjunctival infection from the end of February. 'It was observed that at the end of the winter, when the days are warming up from the end of February, conjunctival sacs without any growth become fewer and more

indicated in table III. The complications are divided into two groups, one caused by smallpox and the second caused by complications. It will be seen that the latter group is much larger. Vesicle and pustule formation on the conjunctiva, sclera and cornea, and sub-conjunctival hæmorrhage constitute group I caused by smallpox and they together are responsible for 19.7 per cent of the ocular complications. Inflammatory conditions of the conjunctiva and cornea with secondary infection and cases of keratomalacia constitute 79.3 per cent of cases.

TABLE II
Ocular complications according to type of the disease

Types of smallpox	Confluent	Semi-confluent	Discrete	Hæmorrhagic	Discrete
Admissions	1,083	319	191	127	209
Ocular complications ..	195	26	5	6	4
PERCENTAGE ..	18.3	8.1	2.6	4.7	1.9

TABLE III
Ocular complications of smallpox

	Total number of cases	Percentage
Group I		
Conjunctival vesicles and pustules.	20	8.4
Corneal vesicles and pustules.	7	2.5
Sclero-corneal vesicles and pustules.	12	5.0
Sub-conjunctival hæmorrhage.	9	3.8
		19.7
Group II		
Acute conjunctivitis ..	27	11.4
Muco-purulent conjunctivitis.	97	41.1
Muco-purulent conjunctivitis with corneal ulcer.	20	8.4
Phlyctenular keratitis ..	10	4.2
Lagophthalmic keratitis (exposure keratitis).	28	11.8
Perforation of cornea, iris prolapse.	3	1.2
Acute keratomalacia ..	3	1.2
		79.3
	236	99.0

The vesicles and pustules of the conjunctiva, sclera or cornea developed during the stage of skin eruptions, the conjunctival lesions being usually bilateral but the sclero-corneal lesions being mostly unilateral. On the conjunctiva, they were found on the exposed part of the bulbar conjunctiva of the palpebral fissure or on the caruncle. The vesicle appeared as small raised areas with mild local reactions and on bursting left no trace. The pustules which were more numerous, caused severe reaction and pain, and soon the area was covered with a slough after the separation of which the healing was fairly rapid. The lesions of the cornea were similar. When they healed they were followed by a dense leucoma but the whole cornea was not affected and some sight was left.

Inflammatory complications varied from simple conjunctivitis to the severer forms of conjunctivitis, keratitis, hypopyon ulcer and perforation of the cornea with prolapse of the iris. The largest group of cases was muco-purulent conjunctivitis. This usually cleared up and left no blindness but, in some, complications were seen such as marginal ulcer. The corneal complications however, though less numerous, were much more serious. Forty-four cases showed serious affection of the cornea, and the rapid development in some of the cases was very remarkable. Within 24 hours of the development of multi-corneal ulcer the cornea became quite opaque and within the next 24 hours it was completely blurred. In these patients deaths were numerous. It was later

believed that these were really cases of acute keratomalacia but they have not been entered as such in the table.

Some other conditions were seen such as exposure keratitis, perforation of the cornea with iris prolapse, but not a single case of hypopyon ulcer was seen, which is strange considering the fact that it had previously been reported as common in smallpox in Calcutta.

Summary.—An account is given of the ocular complications of smallpox seen in Calcutta during the years 1932 to 1939. The analysis shows that only a minority of the complications were caused direct by smallpox and that in the causation of these complications and of the blindness which frequently follows, secondary infection and acute keratomalacia play an important part. It is believed that these complications could now be prevented or controlled by the routine administration, in cases of smallpox, of the sulphonamides and vitamin A.

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FRACTURE-DISLOCATION OF THE CERVICAL SPINE

A CASE REPORT

By N. S. MACPHERSON, F.R.C.S.

Surgeon
and

E. W. GAULT, M.D., M.S. (Melb.), F.R.A.C.S.
Pathologist and Professor of Pathology, Missionary Medical College, Vellore

A CASE of fracture-dislocation of the cervical spine occurred recently in the practice of the Medical College Hospital, Vellore, in which post-mortem examination five days after the accident gave the opportunity to determine the exact nature of the injury and of the mechanism of both displacement and reduction.

Clinical report.—The patient was a Hindu male aged 52. Two days before admission, he was carrying a heavy load on his head; finding it too heavy, he shifted it from his head and in so doing fell down. From that time he was unable to move either arms or legs or to feel anything below the level of his shoulders. It was not possible to find out the exact mechanical cause of the injury beyond the fact that it