OCULAR COMPLICATIONS OF LEPROSY IN SINGAPORE

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INTRODUCTION

Early last year (1960) the Ophthalmic Unit, with the cooperation of the Medical Officer in charge of the Trafalgar Home Leprasorium in Singapore examined the inmates of the Home with a view to assessing the ocular complications amongst the patients there. There are about 800 inmates in the Home but these form a small fraction of the total number of Leprotics in Singapore. There are 4,000 registered leprotics in this state and probably just as many if not more 'underground' ones. Therefore in presenting the results of this survey, no claim is made that it actually represents the incidence of Leprotic ocular complications in Singapore. Although nearly 800 inmates were examined, the figures that are presented in this report are derived from the 427 male outpatients living in the Home and seen in the first part of our survey. Nevertheless, it is felt that it is, clinically, a representative picture of the various types of ocular complications of Leprosy in Singapore.

The inmates of the Home are made up of outpatients and inpatients. All these are infective cases in whom the Leprosy Bacillus was demonstrable at the time of their admission into the home.

EPIDEMIOLOGY

Leprosy is endemic in Africa, Pacific, Far East and Middle East. It is estimated that there are 5 million leprotics in the whole world.

It is believed that the chief portals of entry are via the skin and nasal mucosa. Ocular involvement may be due to local spread from the face or nose but chiefly via the blood stream.

CLASSIFICATION OF LEPROSY

It is perhaps worth while recalling, the international classification of Leprosy as agreed upon by the International Congress of Leprosy held in Havana in 1948.

(a) **The Lepromatous Form** — Also known as nodular or cutaneous form. Here the skin is chiefly involved but the peripheral nerves are often implicated. It is infectious and the Lepra Bacillus is easily demonstrable.

The Lepromin (Sensitivity) Test is weakly positive or negative. The Sedimentation Rate is high.

(b) **The Tuberculoid Form** — Also known as neural or anaesthetic form. The nerves are chiefly involved in this type, with sensory disturbances, palsies, atrophies, contractures and trophic changes. There is present a macular anaesthetic skin rash. The Lepra bacillus is not easily demonstrable.

The Lepromin Test is strongly positive. The Sedimentation Rate is low.

(c) **The Indeterminate Form** — A group that probably lies between the lepromatous and tuberculoid forms and may progress into either one.

A word must be said of the acute lepra reaction which may develop spontaneously or be precipitated by treatment in the early stages. It may be associated with an acute iridocyclitis of a hypersensitive type. Such an acute iritis can produce great damage to the eye if left unrecognised and neglected.

INCIDENCE OF OCULAR COMPLICATIONS IN LEPROSY (see Table I and II)

TABLE I. INCIDENCE IN OTHER COUNTRIES.

COUNTRIES	PERCENTAGE
JAPAN, KOREA, OKINAWA, FORMOSA, HONGKONG	HOLMES 10%
INDIA	less than 10%
HAVANA	100%
ISRAEL	over 90%

TABLE II. LOCAL INCIDENCE.

Patient	Number seen	Number with ocular involvement	%
Male Adult Outpatient	427	152	35.6%
Chronic Males (warded)	39	22	56.4%
Children	123	14	11.4%
Female Adult Outpatient	134	77	57.5%

A very variable percentage of ocular complications can be noted in the different surveys reported in various other countries. This has been well stressed by several authors. Factors that may play a part in this variability are :—

(a) Race :— Ocular complications are found more frequently in lighter skinned races. Prendergast, Cochrane, Chung Hoon and Hedgcock have separately reported on this.

(b) Nutrition :— Avitaminosis, iron deficiency, and protein deficiency may be responsible for the variability in the incidence of ocular complications.

(c) Duration of the Diseases and Treatment :— There is no universal agreement regarding the duration of infection of leprosy and the development of ocular complications. While Kirwan (1955) held the view that it was uncommon to have ocular complications in the first 5 years of the disease, other authors have indicated that involvement of the eye occasionally occurred very early in the disease. Kirwan believed that if leprotic patients lived long enough, eventually all of them would show ocular complications to some degree.

In our survey, although we did not obtain actual statistical figures to substantiate our findings, mainly because it was impossible in many of the cases to trace a record of the duration of the disease in the patient examined, we found that there was a relationship between the duration of illness and ocular complications. We found a greater incidence of ocular involvement in chronic long standing cases and rarely found eye complications in the very young leprotic children (see Table II).

(d) General Health :— Debility, Chronic illnesses e.g. T.B., Diabetes Mellitus, Chronic sepsis tend to increase the susceptibility of a leprotic to ocular complications (Holmes, 1957).

CLASSIFICATION OF OCULAR COMPLICATIONS (see Table III)

TABLE III. CLASSIFICATION OF OCULAR COMPLICATIONS.

AREA	Number involved	Percentage of those involved ocularly (152 Cases)	Percentage of total (427 Cases)
Lid & Brow.	120	78.9%	28.1%
7th Nerve.	25	16.4%	5.9%
Cornea.	46	30.3%	10.8%
Intraocular.	26	17.1%	6.1%
Miscellaneous	—	—	—

With regard to 7th Nerve involvement, whilst it may be argued that 7th Nerve paralysis is not really an ocular complication, it is responsible for many ocular complications and thereby justifies its inclusion in the list.

Under miscellaneous, we found no cases of orbital involvement, ocular palsies or optic neuritis. The lacrimal gland and the drainage apparatus were not found to be primarily involved in any of our cases. Leprotic conjunctivitis too was hardly seen and only one case of epi-scleritis was diagnosed (See Fig. I). All these complications have been reported by various authors to be rare and we have found no reason to contradict this from our survey.

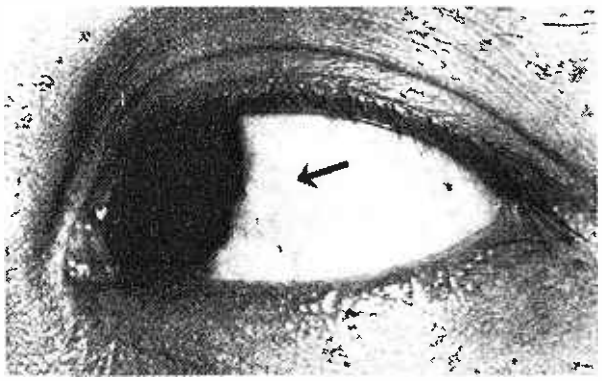

Fig. 1. Photograph shows temporal episcleritis of the left eye.

LID INVOLVEMENT (see Table IV)

TABLE IV. LID INVOLVEMENT.

Loss of Brows	113 out of 120
Madarosis	88 out of 120
Hypertrophy and Nodules	19 out of 120

The highest incidence of ocular involvement is that of the lid and brow and this includes loss of brows, madarosis, hypertrophy and nodules and blepharochalasis (152 out of 427 cases, 35.6%).

Loss of brows is most commonly seen and can be total or partial (see Figs. 2 & 3). When it is partial, usually the lateral halves are involved first.

Madarosis was also frequently seen (see Figs. 2 & 3). It is generally believed and our figures tend to substantiate it, that loss of brows and madarosis are of significance in the diagnosis of leprosy. Apparently these can occur early in the course of the disease and quite often exist alone without other ocular complications.

Hypertrophy and nodules of the lids are part of the cutaneous manifestations of leprosy (see Fig. 4). The upper lid is more often involved.

Blepharo-chalasis of the upper lids was seen in 6 cases and is the result of stretching of the skin by nodules which have since resolved.

Fig. 2. Photograph shows bilateral total loss of brows and madarosis (loss of eye lashes).

Fig. 3. Photograph shows features as described in Fig. 2.

Fig. 4. Photograph shows multiple lepromatous nodules involving both upper lids.

SEVENTH NERVE INVOLVEMENT (see Table V)

Weakness of the orbicularis oculi leading to lagophthalmos, ectropion, resultant exposure kera-

TABLE V. SEVENTH NERVE INVOLVEMENT.

(1) Seventh Nerve Involvement	Bilateral 12 Unilateral 13	Total Eyes 37.
(2) Lagophthalmos	Bilateral 12 Unilateral 11 Percentage of 7th N. Involvement = 94.6%	Total Eyes 35.
(3) Ectropion	Bilateral 6 Unilateral 6 Percentage of 7th N. Involvement = 48.6%	Total Eyes 18.
(4) Exposure Keratitis	Bilateral 3 Unilateral 3 Percentage of 7th N. Involvement = 24.3%	Total Eyes 9.
(5) Epiphora	Bilateral 8 Unilateral 7 Percentage of 7th N. Involvement = 62.2%	Total Eyes 23.

titis and epiphora is of fairly high incidence (see Figs. 5, 6 & 7) and is due to the peculiar susceptibility of the branches of the seventh nerve supplying the orbicularis oculi to the Lepra bacillus. So much so, that we believe it is of some importance in the recognition of Leprosy. One of us (R.L.C.K.) recently diagnosed 2 cases as Leprotics when they came up to the Ophthalmic Unit referred for their symptoms of unilateral epiphora. These were confirmed when the Lepra Bacillus was demonstrated in these 2 cases. Another observation is that in unilateral cases the 7th Nerve seems to be affected more often on the side where lepromatous patches are seen on the face.

The relatively lower incidence of Exposure Keratitis in our cases is probably because of the associated low incidence of 5th Nerve paresis. A combination of 5th and 7th palsy on the same

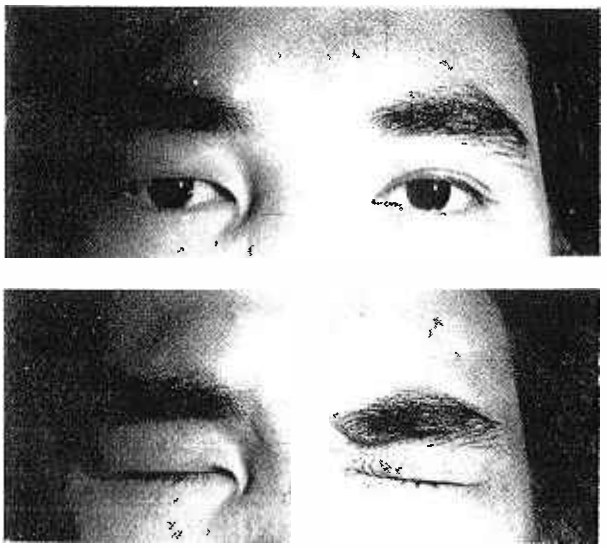

Fig. 5. Photographs illustrate early paresis of the right orbicularis oculi due to involvement of branches of the facial nerve supplying the muscle.

side always enhances the risk of exposure keratitis (see Fig. 8).

Epiphora is of considerable annoyance and is due to the sagging of the lower lids and loss of the pumping action of the orbicularis oculi on the lacrimal sac. (see Fig. 7).

We cannot but emphasize the need of such cases of 7th Nerve paresis for surgical correction of the lids, relief of epiphora and protection of the corneae. These are relatively simple procedures and should be carried out as soon as they are indicated.

Fig. 6. Photographs illustrate bilateral paresis of orbicularis oculi with lagophthalmos. Deep red lepromatous patches which are slightly elevated, and subtotal loss of eye brows are also seen.

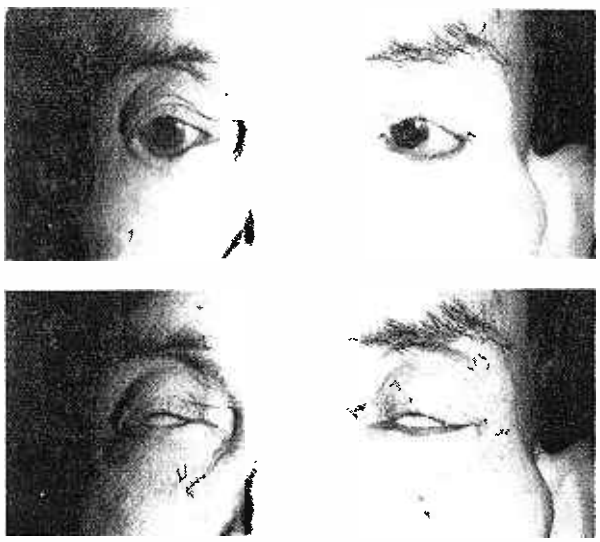

Fig. 7. Photographs show another case of bilateral paresis of orbicularis oculi, with Bell's phenomena (rolling up of eyeball during contraction of orbicularis oculi). Note the lagophthalmos, epiphora (tearing) and ectropion (eversion of lids), the results of the paresis.

Fig. 8. Photograph illustrates fairly advanced case of exposure keratitis following lagophthalmos. This complication is more likely to occur and more serious if the lagophthalmos is associated with loss of corneal sensation secondary to involvement of the fifth cranial nerve.

CORNEAL INVOLVEMENT (see Table VI)

TABLE VI. CORNEAL INVOLVEMENT

Excepting those due to Exposure associated with 7th Nerve Palsy.	
(1) Deceased sensitivity or anaesthesia of cornea	Definite 4 cases. Doubtful 8 cases.
(2) Leprotic Pannus	20 definite 8 doubtful bilateral. 2 definite unilateral.
(3) Superficial Punctate Keratitis	15 Bilateral. 4 Unilateral.
(4) Leproma	6 Bilateral. 3 Unilateral.
(5) Interstitial Keratitis	3 Bilateral. 5 Unilateral.
(6) Sclerosing Keratitis	1 Unilateral.

(1) Decreased Sensitivity or Anaesthesia of the Cornea :—

In our survey, it is not a common finding in contrast to the findings of other surveys elsewhere. As remarked before, this may be associated with the relatively lower incidence of Exposure Keratitis in our series.

(2) Leprotic Pannus :— (see Fig. 9)

Some difficulties arose, not unexpectedly, in differentiating this from trachomatous pannus.

Trachoma is endemic in Singapore but we based our diagnosis of leprotic pannus on these points :—

(a) It usually involved the corneae in all sectors.

(b) The vascularization usually did not follow the pattern of loops as in trachoma.

(c) And there were no other associated signs of trachoma e.g. follicles, cicatrization. We found this in 30 cases.

(3) Superficial Punctate Keratitis :— (see Fig. 9)

A typical appearance of milky greyish spots of the superficial layers of the cornea, quite often with the appearance of chalk-like grains scattered in a haphazard fashion. It is generally considered to be pathognomonic of ocular leprosy.

We found it in 19 cases of which 15 were bilateral.

(4) Leproma :—

This usually presented as a fairly well circumscribed lesion, usually placed centrally, involving the deeper layers with a clear periphery. Nine cases were found.

(5) Interstitial Keratitis :—

We saw 13 cases with Interstitial Keratitis. No definite clinical appearance seems to be attached to this lesion and diagnosis is mainly by exclusion.

(6) Sclerosing Keratitis :—

Only one case was seen and it was fairly well developed.

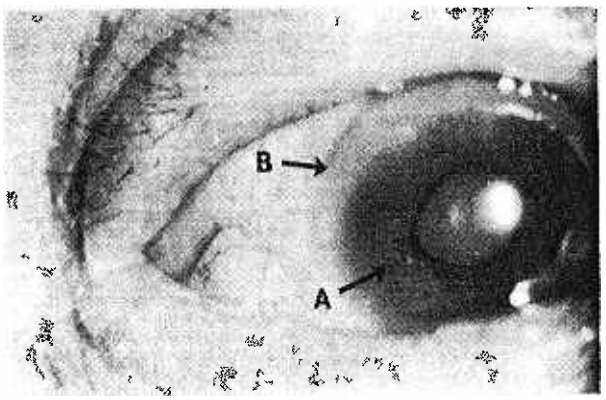

Fig. 9. Photograph illustrates lepromatous pannus with characteristic superficial chalky keratitis, the latter not well seen. (A). On the iris are several discrete, rounded, whitish yellow nodules often called "iris pearls" (B).

INTRAOCULAR INFLAMMATIONS (see Table VII)

TABLE VII. INTRAOCULAR INFLAMMATION

Area.	Type of Inflammation	Number of Cases.
Posterior Segment.	-	1.
Anterior Segment.	(a) Acute non-granulomatous like Iridocyclitis	1.
	(b) Chronic plastic Iridocyclitis	23.
	(c) Miliary lepromata of iris	1.
	Total Cases	26.

(1) Posterior Segment

Although fundi examination was carried in all the cases, only one patient showed posterior segment involvement in the form of retinal pearls. No case of optic neuritis and chorioretinitis was seen. There is no doubt that leprosy very rarely involves the posterior segment of the eye.

(2) Anterior Segment

(a) *Acute Iridocyclitis:*— Only one case was seen. Acute Iridocyclitis is occasionally associated with acute lepra reactions and quite often complicated by glaucoma. It is believed that acute iridocyclitis of leprotic origin is rare and when such an inflammation is seen, and an acute lepra reaction excluded, it's association with leprosy is more likely fortuitous. Other causes must be excluded.

(b) *Chronic Plastic Iridocyclitis:*— This is much more common. 23 cases in all were seen. This chronic form is often associated with glaucoma and complicated cataract.

(c) *Miliary Lepromata of Iris:*— One case was seen in our series, though it was found fairly frequently in other surveys. It is believed to be pathognomonic of ocular leprosy. The lepromata are whitish pearl-like structures which are not affected by treatment (see Fig. 9).

BLINDNESS IN LEPROSY

We found (i) Total Blindness in 7 eyes.
(ii) Partial Blindness in 5 eyes (2 due to cataract).

The usual causes of blindness in Leprosy are :—

TABLE VIII. CAUSES OF BLINDNESS.

CAUSES	TOTAL BLINDNESS	PARTIAL BLINDNESS (vision less then counting fingers at 3 metres)
(a) Chronic Iridocyclitis	3 eyes	—
(b) Exposure Keratitis —7th Nerve palsy	1 eye	—
(c) Lepromatous Keratitis	3 eyes	1 eye
(d) Acute Iridocyclitis	—	—
(e) Other non leprotic causes e.g. Glaucoma Cataract etc.	—	4 eyes (2 bilateral cases)

Blindness occurs if the ocular complications are neglected and is therefore preventable. We found no cases of bilateral Total Blindness. In our survey, we thus found 10 patients in whom vision was badly effected in one or both eyes, eight of which were directly due to leprosy (less than 2% of patients examined).

CONCLUSION

A host of ocular complications can arise in leprosy. Some are useful for diagnosis, some are of no consequence, whilst some are either preventable or can be mitigated by early recognition and therapy.

Since more than one-third of our cases presented ocular complications, it would seem therefore that a regular ocular check up on leprotic patients would be valuable. We particularly stress the need for periodical examination of the 7th and 5th nerves and a search to exclude iridocyclitis.

There appears to be a relationship between the period of leprotic infection and the advent of ocular involvement. It is not possible to state the actual relationship between the duration of the disease to the type of ocular involvement.

If minor lesions (e.g. madarosis, loss of eye brows) of the lids and brows are excluded, then only 15% of the cases examined had ocular manifestations which had a serious significance. Of the latter, corneal complications were the most common.

Loss of eyebrows and madarosis had the highest incidence showing a 78.9% involvement of all patients examined. It appears to be an early sign of leprotic ocular involvement and therefore useful in the diagnosis of leprosy.

7th Nerve palsy was seen fairly frequently (16.4% of those ocularly involved). In Singapore, it is worthwhile remembering that, if trauma and Bell's palsy is excluded, Leprosy may cause an apparent isolated 7th Nerve palsy.

SUMMARY

1. A report is made on the first part of a survey conducted on nearly 800 patients in the Trafalgar Home for Leprotics in Singapore.
2. A wide variety of ocular lesions are reported amongst the 427 male adult outpatients examined.
3. No claim is made that the figures presented are indicative of the actual frequency of the

various ocular complications seen in leprotics in Singapore. There are just as many 'underground' as known registered leprotics in Singapore, which stresses the need for a more vigorous approach to the public health problem of leprosy in Singapore.

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