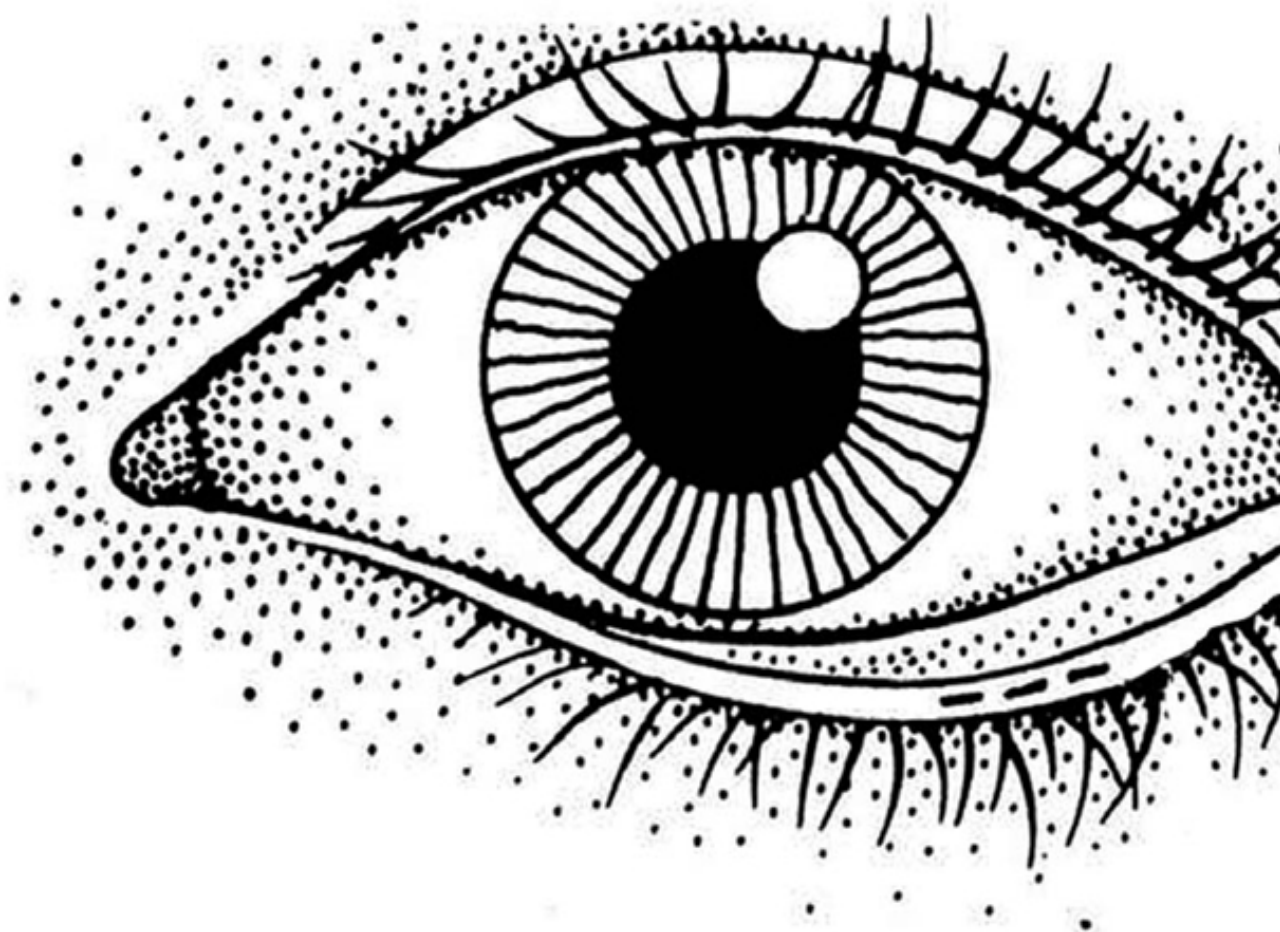


PREVENTION OF BLINDNESS IN LEPROSY



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**PREVENTION OF BLINDNESS IN LEPROSY
2ND EDITION**

**Edited by:
Paul Courtright
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GLOSSARY

Aqueous flare

The evidence of protein in the aqueous humour, a sign of breakdown of the blood-aqueous barrier, often due to inflammation of the iris and ciliary body.

Dermatachalasis

Loss of normal elasticity of the skin leading to excessive skin folds, particularly of the upper eyelids.

Ectropion

Outward turning of the eyelid margin, so that it is not in contact with the eyeball.

Entropion

Inward turning of eyelid margin, toward the eyeball.

Erythema Nodosum Leprosum (ENL)

An inflammatory condition of the skin characterised by painful red nodules and often accompanied by fever and joint pains; a feature of the multibacillary form of leprosy. ENL is often referred to as Type 2 Reaction.

Fluorescein

A chemical solution used to demonstrate superficial corneal damage, which appears as a bright green area.

Iridectomy

Surgical excision of a piece of the iris.

Iritis

Inflammation of the iris; commonly associated with inflammation of the ciliary body. The combined condition is iridocyclitis. Iritis is often referred to as anterior uveitis.

Keratitis

Inflammation of the cornea. In avascular keratitis new blood vessels are not yet invading the cornea. Exposure keratitis refers to inflammation of the cornea due to exposure and drying of the surface.

Lagophthalmos

A condition in which the eyelids cannot be completely closed to protect the cornea.

Meibomian glands

Glands situated in the tarsal plates of the eyelids secreting an oily substance, which spreads over the surface of the tear film and prevents excessive evaporation.

Miotic pupil

Small contracted pupil.

Multibacillary

Leprosy which includes polar lepromatous (LL) borderline lepromatous (BL) and mid-borderline (BB) types in the Ridley-Jopling classification. For field use, multibacillary includes all patients with more than 5 skin lesions.

Multi-Drug Therapy (MDT)

The combined therapy which may include rifampicin, clofazimine and dapsone and others recommended by WHO for treatment of multibacillary and paucibacillary leprosy.

Paucibacillary

Leprosy which includes only smear-negative indeterminate (I), borderline tuberculoid (BT) and polar tuberculoid (TT) cases in the Ridley-Jopling classification. For field use, paucibacillary includes patients with up to 5 skin lesions.

Reversal reaction

This reaction, which can occur in both PB and MB leprosy (mainly in formerly borderline patients of Ridley-Jopling classification), is the result of a sudden change in cellular immunity and is characterised by acute exacerbation of skin lesions and often accompanied by acute neuritis. Reversal reaction is also referred to as Type I Reaction.

Synechiae

Adhesions between iris and anterior lens capsule.

Trichiasis

One or more eyelashes rubbing against the eyeball.

INTRODUCTION

The problem of eye involvement as a cause of disability in leprosy is well recognised. The successful, widespread use of multidrug therapy has led to significant reductions in the prevalence of leprosy worldwide; subsequently, there has been increased attention to the problem of disabilities, including those relating to visual loss.

A workshop on ocular leprosy was held in Broxbourne, UK from 3-5 July 2001, organized by the British Columbia Centre for Epidemiologic & International Ophthalmology and LEPRA and sponsored by ILEP. The list of participants at the 2001 workshop is given in Annex 1. The 2001 workshop came almost 11 years after the first ocular leprosy workshop, in London, in September 1987. Significant changes in the management of leprosy as well as increased knowledge about the ocular manifestations of leprosy led to the need for major changes to the earlier "Prevention of blindness in Leprosy".

This booklet, resulting from the workshop, is intended for use by all health workers and programme managers involved in leprosy control and prevention of blindness. We are grateful to the workshop participants for all of their contributions.

Publication of this booklet was made possible by a grant from American Leprosy Missions.

OVERVIEW

Visual impairment and blindness occur in patients with ocular leprosy; these individuals form a severely disadvantaged group because of other disabilities due to the disease, its social stigma and the difficulties and delay in receiving appropriate eye care.

Annually, 500,000 to 700,000 leprosy patients are being detected and put on anti-leprosy treatment. Since 1985 about 15 million leprosy patients have been diagnosed and been put on MDT treatment.

Data on blindness in leprosy is incomplete and often unreliable, because of the problems in obtaining representative population-based estimates. From existing surveys it is estimated that between one-quarter and one-half a million leprosy or ex-leprosy patients could be blind (vision less than 6/60). The visual disability in these patients is compounded by other disabilities, particularly sensory impairment and deformity of the extremities.

The incidence of blindness in ocular leprosy is influenced by many factors, especially anti-leprosy treatment, the type and duration of the disease, and eye treatment received. The three major pathways to blindness from leprosy are:

1. Corneal opacity arising from exposure associated with lagophthalmos and diminished corneal sensation
2. Iridocyclitis and its sequelae
3. Cataract arising as a complication of uveal and corneal disease.

In addition, many elderly leprosy patients are blind as a result of age related cataract. This may not be directly related to leprosy, but because of leprosy, these patients often have less access to surgery.

Whereas corneal involvement occurs in both types of leprosy (paucibacillary and multibacillary), iridocyclitis is characteristic of multibacillary disease. This, and differences in age at disease recognition, probably account for regional differences, i.e., corneal disease in Africa and the Indian subcontinent where paucibacillary disease predominates, and iris involvement in East Asia and South America where multibacillary disease predominates.

Ocular leprosy represents a considerable source of avoidable blindness, which can be greatly reduced by early detection of patients at risk, and appropriate management. This calls for intensified efforts in the training of health personnel and patient education and integrating leprosy and ex-leprosy patients into general eye care services.

CHAPTER 1

OCLUAR LEPROSY AS A GLOBAL CAUSE OF BLINDNESS

Multidrug therapy (MDT) has greatly reduced the incidence of eye disease in leprosy. Nevertheless, people who have leprosy or who have had leprosy in the past (referred to here as ex-leprosy patients), continue to have eye complications as a result of the disease or as a result of other causes, such as cataract.

The lack of reliable details on total numbers of people affected by leprosy, together with the great variation in the frequency of eye complications in different populations, continues to make estimation of the prevalence of blindness and ocular involvement in leprosy difficult. The prevalence of eye disease in ex-leprosy patients varies considerably, primarily as a result of variations in previous anti-leprosy treatment, the condition at leprosy diagnosis, and the age of the patient.

A review of the world literature shows wide variation in the methods, planning, setting up and reporting of ocular leprosy surveys. Many studies taken from leprosaria have a predictably high prevalence of eye disease. Even the definition of blindness and the evaluation of ocular manifestations in respect of visual impairment have not been sufficiently standardised to allow firm conclusions to be drawn from these studies.

Meaningful estimates of the prevalence of blindness among people affected by leprosy are further hindered by regional variability of case management procedures. Ocular disease is, not surprisingly, a function of disease duration. The duration of disease at diagnosis may vary according to health service coverage, the level of awareness of the disease, and the social stigma of leprosy.

At the time of diagnosis, ocular disease due to leprosy is not uncommon; approximately 11% of people with multibacillary (MB) leprosy (from the LOSOL study in Ethiopia, India, and the Philippines) have lagophthalmos, uveitis, or trichiasis related to their disease at diagnosis. These conditions will remain after MDT and put the person at risk for blindness in the future; this is of particular concern if the person is discharged from the health care system with no provision for follow up. In these populations the primary predictors of leprosy related eye disease were older age, the presence of other disabilities and reactions involving the face.

Research from the LOSOL study has provided, for the first time, reliable data on the incidence of eye disease in MB patients during MDT. During two-year MDT around 2% of MB patients developed lagophthalmos and 7% developed uveitis. Research on the incidence of ocular disease following completion of MDT suggests that uveitis continues to develop. There is no data on the incidence of eye problems among paucibacillary patients during or after MDT, although it is presumed to be much lower than among multibacillary patients.

CHAPTER 2

THE CLINICAL DISEASE

Changes in the eyelids

In order for the eyelids to protect the eye by spreading tears and clearing the cornea of debris, they must have the necessary rigidity, the correct curvature and the proper lid margin apposition. They must be able to open and close under voluntary control, perform spontaneous intermittent blinking, and respond with a defensive blink reflex.

In leprosy a considerable number of patients, whatever the clinical type of the disease, are at risk of developing lagophthalmos. For the patient who develops a reversal reaction, and who already has skin involvement of the face, in particular in the area overlaying the facial nerve, lagophthalmos may develop early in the disease and has a sudden onset. Unless intervention with systemic steroid treatment is prompt, much of the orbicularis oculi function may be lost.

Without anti-leprosy treatment, multibacillary patients develop paresis later in the disease and they often have corneal sensory loss by that time. These patients then have little or no urge to blink, nor can they do it adequately with voluntary effort. They are at high risk and require early surgical intervention to avoid corneal damage. In some longstanding MB cases corneal sensory loss (and exposure keratitis) can occur unrelated to lagophthalmos.

Lagophthalmos generally develops either before or within six months of the start of treatment and in relation to a reversal reaction. Development of lagophthalmos during the later course of anti-leprosy treatment is not common; the incidence of lagophthalmos is generally less than 1% per year. Most of the lagophthalmos in leprosy is the result of nerve damage affecting the zygomatic and temporal branches of the VIIth cranial nerve. In addition multibacillary patients may have destruction of the delicate marginal and pretarsal fibres of the orbicularis oculi muscle due to infiltration by *Mycobacterium leprae*.

Since the branches of the VIIth nerve are randomly involved, the extent of the resulting paresis is variable. Many observers note that the lower lid is commonly affected first, especially the marginal fibres. The characteristic effect is a slack, drooping lower lid, exposing the sclera inferior to the cornea (ectropion), a condition that interferes with adequate support of the precorneal tear film (Figure 1).

Paresis of the pretarsal muscle (in the upper lid) results in exposure of the cornea in sleep. Paresis of the peripheral, strong preorbital part of the orbicularis muscle may occur but is not common (Figures 2,3). By using this part of the muscle many patients are able to achieve closure by deliberate forced effort even though there are serious deficiencies in closure during sleep and lack of the protective defensive blink. The eye is undoubtedly at risk, but providing that sensation is adequate, the cornea may remain remarkably healthy.

Infiltration of the skin and other lid structures by *M. leprae* results in further significant changes, in addition to the nerve and muscle damage and resulting lagophthalmos:

1. Loss of elasticity of the skin with premature accentuated dermatochalasis and heavy, drooping, upper lids. The weight of skin may cause an in-turned eyelid margin (entropion) and trichiasis may result.
2. Atrophy and stretching of the canthal tendons contributes further to the condition of ectropion of the lower lid margin.
3. Atrophy of the tarsal plate, which results in thin floppy lids that are less efficient in spreading tears and cleaning the cornea.
4. Atrophy of tissues supporting the eyelash follicles may result in the loss of eyelashes, while the remaining lashes tend to hang against the cornea or bulbar conjunctiva. The remaining lashes are often short and atrophic. With severely impaired corneal sensation, the patient ignores the situation. In those patients whose sensation is less impaired the discomfort of the lashes may be interpreted as an 'itch'. The patient will be tempted to rub the eye with calloused, insensitive and often infected fingers. The cornea may be damaged and ulcerate.
5. Meibomian glands may become infiltrated and secondarily infected, with atrophy as the ultimate result. This may contribute to the poor quality of the tear film seen in many patients with long-standing disease.

Medical management of lagophthalmos

With early and effective anti-leprosy treatment, serious damage to the eyelids can be largely averted. However health workers should keep in mind the risk of reversal reaction, affecting the VIIth cranial nerve and causing extensive motor loss. Patients with pre-existing patches in the face are at particular risk (Figure 6).

Prompt intervention by means of systemic steroids can prevent permanent damage in those cases and so help to safeguard the cornea. Recent facial nerve damage, with a duration of less than 6 months should also be treated with systemic steroids, as should any recent nerve damage in leprosy. A recommended semi-standard regimen for systemic steroids is as follows:

A starting dose of 40 mg of prednisolone daily for 2 weeks would be followed by a decrease by 10 mg every two weeks until 20 mg is reached. Thereafter, decrease the dose by 5 mg every 2 weeks. The total duration of the course is 12 weeks. The starting dose may be increased if no improvement occurs within the first few days. In addition, exercises, 'Think blink' and corneal protection devices (such as sunglasses) may be necessary.

Surgical management of lagophthalmos

Lagophthalmos surgery should be provided to patients who need it. Evaluation of the need for lagophthalmos surgery should be based on one or more of the following conditions: size of lid gap, corneal exposure, corneal hypoesthesia, visual acuity, and/or cosmetic difficulties. Permanent tarsorrhaphy has been used frequently, but the result may be cosmetically unacceptable to the patient. The loss of the temporal field of vision is a disabling side effect of a temporal or lateral tarsorrhaphy. There are a number of other comparatively simple surgical procedures being used for lagophthalmos surgery. An appropriate procedure in many situations is the modified lateral tarsal strip procedure (Annex 3), but there is little evidence to support the superiority of any one procedure. Regardless of the procedure, with time, surgical failure becomes more likely: patient education and follow up of surgical cases is strongly encouraged. Standardised routine monitoring of the outcome of lagophthalmos surgery is recommended. (Annex 2)

Trichiasis

Trichiasis is not an uncommon finding in leprosy patients; it has been recognized in 1% of MB patients at the time of their disease diagnosis (Figure 5). Among ex-leprosy patients the incidence of trichiasis was approximately 1% per year. Trichiasis has been shown to be responsible (along with lagophthalmos) for incident corneal disease in leprosy patients. Trichiasis in leprosy may be due to loss of support of lash follicles, secondary to infiltration by *M. leprae*. Eyelid ptosis, associated with laxity in the pretarsal tissues, may also be the underlying cause of trichiasis in many leprosy patients. Surgical management (rather than epilation) of trichiasis is recommended in most cases, particularly those in which irritation is noted.

Corneal changes

The major corneal change in ocular leprosy is exposure keratitis due to lagophthalmos, in particular in combination with reduced or absent corneal sensation (Figure 2). To a lesser extent, corneal damage may be caused by trichiasis. The insensitive and unprotected cornea can be readily damaged by foreign bodies and drying. Exposure of the cornea to drying can result in destruction of the corneal epithelium. The early stages can be recognized by fine punctate superficial lesions on the cornea, usually in the lower outer part of the cornea. Secondary bacterial infection or a foreign body may subsequently cause a corneal ulcer. Chronic infection of the tear sac (dacryocystitis) is an aggravating factor, potentially leading to bacterial corneal ulcers.

Protection must be provided to those patients with lagophthalmos by any means effective in narrowing the aperture between the eyelids and keeping the cornea lubricated. Active exercises may be helpful in improving lid function. There should be frequent use of tear substitute drops if these are available, and ointment or oily drops at night. Sunglasses and other protective devices are also very helpful. Surgery for lagophthalmos should be provided when the surgeon judges that the cornea is in danger, as per the guidelines above. A corneal ulcer must be treated immediately with an antibiotic eye ointment. The patient may need to be referred for further specialist treatment and/or surgery.

Reduced corneal sensation can also contribute to corneal ulceration, although this has not been carefully studied. Although it is not completely reliable, corneal sensation can be determined by the use of a clean wisp of cotton-wool. This need not be done routinely: irregular or absent blinking in a patient without lagophthalmos also may indicate decreased corneal sensation. The cornea is touched with the cotton and the patient's absence of a blink response or denial of feeling the touch is recorded. Patients with reduced corneal sensation are at higher risk of corneal ulceration and erosion, as there may be no pain as a warning sign. A temporary central tarsorrhaphy may be necessary to get the cornea to heal. Once the cornea has healed a more cosmetically acceptable procedure can be done. Corneal scarring can be recognized with the aid of a torch, and its effect on vision is determined by its location.

Other less common corneal problems in untreated, multibacillary patients with high bacillary loads, include avascular punctate keratitis (Figure 8), pannus, corneal beading and limbal lepromas. Avascular (not to confused with 'fine punctate superficial lesions' mentioned previously) punctate keratitis first appears as faint, discrete superficial opacities in the upper, outer quadrant of the cornea.

Histologically they consist of clumps of bacilli-laden cells. They may become dense white tiny opacities resembling specks of chalk-dust. As the disease progresses, they may coalesce to form a diffuse haze. This keratitis is usually asymptomatic, the eye remaining white. Later, blood vessels may grow into the cornea, and fresh lesions develop alongside the vessels to form lepromatous pannus.

Beading of nerves in the periphery of the cornea appears as focal areas of thickening of the nerves with high magnification. This sign is pathognomonic of leprosy, but not necessarily correlated with reduced sensation. A limbal leproma is a nodule, usually arising from the ciliary body; the pupil is often drawn to the side of the leproma. It may grow to encroach on the cornea. These lesions have become rare since the earlier diagnosis of leprosy and the universal use of MDT.

Iris Involvement

The frequency of uveal involvement in leprosy varies considerably in published series and in different countries. The interpretation of reports is made difficult by the lack of standardisation of examination techniques and recording. However, recent research using standard recording has shown a similar frequency in multibacillary patients in Asia and Africa, once other demographic factors, age in particular, are controlled for. The iris may be involved in leprosy either in the acute form of iridocyclitis, which occurs as part of the ENL (Erythema Nodosum Leprosum) reaction, or as a chronic process. The acute form is not different from any other acute iridocyclitis, causing pain, photophobia and pericorneal redness (Figure 7). Often a severe uveitis may cause so much diffuse redness that it seems to also be a scleritis. The treatment is topical application of atropine and steroids, which should be administered immediately to avoid complications.

Episcleritis also commonly occurs as part of the ENL reaction in leprosy. Episcleritis is an inflammation of the elastic connective tissue beneath the conjunctiva and above the white sclera. There is a localized area of diffuse redness, which may be painful and locally tender (Figure 9).

A chronic insidious form of iridocyclitis may occur in multibacillary leprosy, especially in those who had a long period of inadequate treatment prior to starting MDT. The chronic iridocyclitis will tend to lead to iris atrophy and a small pupil (Figure 10), and these patients may become blind because of the combination of a small pupil and mild corneal changes or cataract in the visual axis.

Once iris atrophy and a small pupil are recognized, it has often been recommended that this be treated long term with topical atropine or phenylephrine in an attempt to stimulate pupillary dilation. It is not clear, however, how useful this is. When cataract accompanies the small pupil, it should be removed. Since these 'complicated cataracts' pose a surgical challenge, they should be operated by experienced ophthalmologists in centres with adequate facilities to deal with the challenge.

Cataract

A cataract is an opacity or cloudiness of the lens, reducing vision and (when very advanced) causing the pupil to appear grey or white (Figure 4). Cataract is the leading cause of blindness in leprosy affected persons, probably responsible for over 75% of incident blindness. Cataract occurs with increasing age; the risk of cataract is 2.5 to 3 times more common in MB leprosy (or ex-leprosy) patients with evidence of chronic uveitis. In an individual patient, however, it is often not possible to determine whether or not the cataract is due to leprosy, or is simply age related.

Cataract is treated surgically by removing the cloudy lens and preferably replacing it with a synthetic intraocular lens (IOL). Although cataract surgery can be done without an IOL, the visual benefit is very much less. Research shows that cataract surgery with IOL implantation, even in patients with evidence of chronic uveitis, can be done safely and will provide a good quality outcome. In cases with longstanding chronic uveitis, the surgery will be more challenging; nonetheless, IOL implantation, where available, should be promoted among leprosy patients who need cataract surgery. In most cases timely removal of a visually disturbing cataract and implantation of an IOL will lead to a better outcome than waiting until the cataract is very mature. High quality surgery can only be ensured if people with leprosy are accepted into the general eye care services. Routine assessment of the outcome of cataract surgery is strongly recommended. Education of health workers (including eye care staff) is required to ensure that leprosy patients gain access to eye care facilities.

CHAPTER 3

ACTIVITIES FOR PREVENTION OF BLINDNESS

IN LEPROSY

People need not go blind from leprosy. For the primary prevention of blindness, early detection and systemic treatment of leprosy are of utmost importance. Leprosy Elimination Campaigns (LECs) have been successful in mobilizing community involvement and reducing the stigma associated with leprosy. Eye care for leprosy and ex-leprosy patients must be included in district/region based VISION 2020 plans. Integration of leprosy and eye care will reinforce and complement VISION 2020 initiatives and strengthen leprosy control activities. Integration of leprosy into VISION 2020 plans must be accompanied by education of district and regional eye care staff to reduce the stigma associated with the disease and to strengthen their ability to provide high quality eye care services.

Leprosy patients and ex-leprosy patients with disabilities form a distinctly disadvantaged group. Disability due to deformities of the extremities receives attention because it is obvious, but ocular morbidity may be overlooked. In many developing countries, leprosy patients also receive a low priority in obtaining eye care in the general ophthalmic service. This is because of their generally low socioeconomic level and the stigma of leprosy. Nonetheless, it is critical that leprosy patients (during their anti-leprosy treatment and after release from treatment) be integrated into general health and eye care programmes. Only in this way can they be assured of receiving acceptable quality eye care, particularly for treating cataract. Integration will require close collaboration between leprosy control and prevention of blindness programmes. At the national, regional, and local levels strong political commitment (including professional organisations) is needed to integrate leprosy patients into general health and eye care programmes.

Further steps that are needed include the creation of explicit guidelines and instructions on eye care in leprosy within national leprosy programme manuals. In planning for Prevention of Disability (POD), guidelines as well as budgets for implementing eye care activities are required. A chapter on prevention of blindness in leprosy should be included within manuals and guidelines for eye care staff in national prevention of blindness programmes.

Present action in eye health care

An integrated primary health care approach to blindness prevention has been developed in many countries with 'primary eye care' as one of its cornerstones.

This implies provision of simple eye care at the community level by trained health workers, together with basic health education for the promotion and protection of eye health. This approach is equally valid for cases of eye disease due to leprosy.

Primary eye care can be divided, from a management point of view, into several categories of action:

- Recognition and referral of visual impairment or blindness
- Recognition and treatment of common and simple disorders, such as conjunctivitis and superficial foreign bodies
- Recognition, initial treatment and referral of some conditions such as lagophthalmos and corneal ulcers
- Recognition and referral of remaining cases, such as painful red eyes and sudden loss of vision.

The primary eye care scheme needs continuous support from higher levels of the health services, in order to provide timely and appropriate care of referred cases. There is a need for refresher courses and supervision of the workers providing primary eye care, if deterioration of the work being performed is to be avoided.

The intermediate level of eye care is usually found in eye departments or in special clinics of district and provincial hospitals. At this level either trained ophthalmic assistants or medical officers (or possibly, ophthalmologists) are usually available.

The tertiary level of eye care is normally found in university clinics or major hospitals. Experience has shown that whereas a primary eye care scheme can be relatively easy to set up at the periphery, the problem is maintaining adequate support and supervision and ensuring that there is sufficient capacity to deal with all referred cases at the intermediate level.

Present action in leprosy control

Leprosy control is carried out at the country level in a variety of ways. Some programmes still function as vertical services, while others are completely integrated within the primary health care services. Most programmes conduct leprosy control through various combinations of the two approaches. Globally, the general trend is to integrate leprosy control into primary health care services.

The present activities related to ocular leprosy are generally unsatisfactory in control programmes, whether vertical or integrated. The training given on ocular leprosy, including its prevention and management, is rather limited even for personnel meant for specialised leprosy services. Further, leprosy institutions or hospitals, which act as referral points often do not have sufficient technical or material resources to deal with the problems of ocular leprosy effectively. While the referral services available at general ophthalmic centres are capable of dealing with many of the ocular leprosy problems, the services very often are not available or accessible for leprosy patients. This is part of the problem of the non-acceptance of leprosy patients in general health services. Another dimension of the problem is the low priority that leprosy and its ocular manifestations receive within the undergraduate medical curriculum.

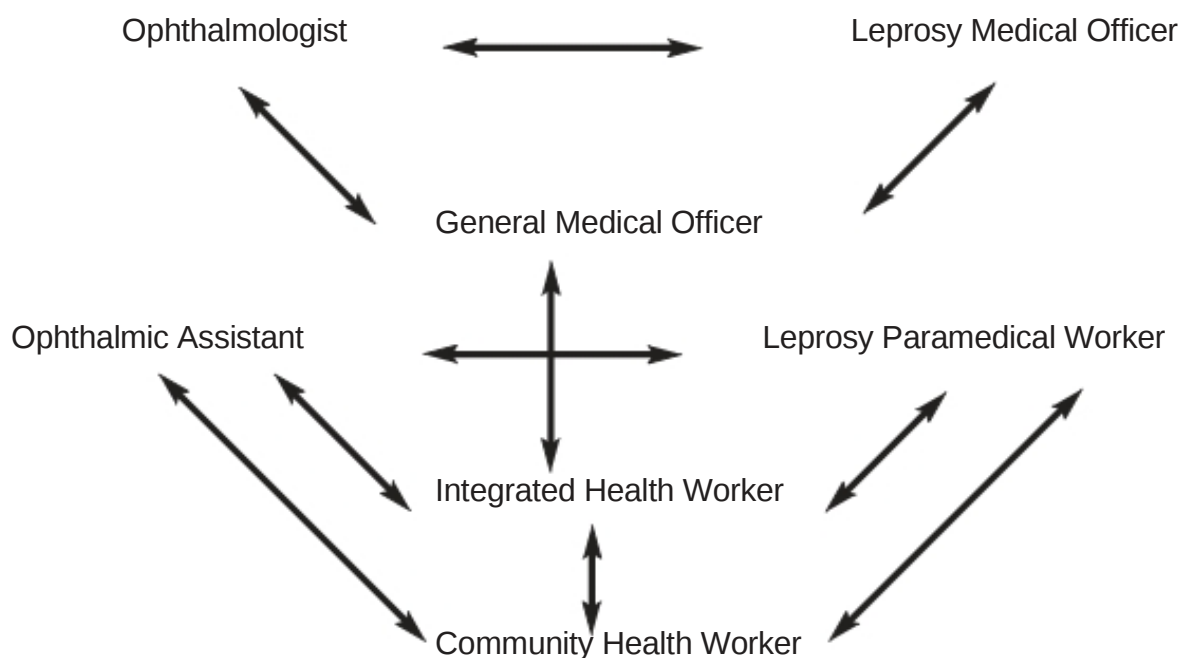
Co-ordination of activities

Ocular leprosy should be a component of integrated health care, leprosy control, and prevention of blindness programmes. In order to make the best possible use of available resources, it is important to co-ordinate carefully the management of patients with ocular leprosy. Ophthalmologists and other staff involved in the provision of eye care should be better trained in the diagnosis and treatment of ocular leprosy and motivated to care more for those patients. Opportunities should be provided for ophthalmologists to visit leprosy centres, and to assume responsibility for the care of patients with ocular leprosy. Training in the recognition and treatment of ocular complications from leprosy should be included in the undergraduate and postgraduate programmes. Such programmes should include clinical teaching with examination of patients with ocular leprosy in general eye clinics. Surgical intervention (primarily for cataract and lagophthalmos) should be an integral part of training and treatment programmes. Ultimately, the quality of eye care received by those affected by leprosy will not be better than the quality available to the general population; therefore it is to the benefit of leprosy patients that general eye care programmes be supported.

A training component that addresses the skills and activities of health workers in relation to care of eyes in leprosy should be introduced into national VISION 2020 and leprosy control plans. The plan should address the needs at different levels and should include the needs of existing health workers through supplementary courses, and of health workers currently in training through medical, nursing and paramedical curricula. In every setting with a leprosy control programme, a practical referral system needs to be clearly defined.

Workers at all referral points need to be educated regarding the eye care needs of leprosy patients. Integrated health workers or leprosy paramedical workers should be trained in the recognition of ocular leprosy and to perform regular screening of patients, to identify those in need of treatment or referral.

The diagram below illustrates the various possibilities for interaction at different levels between the health personnel concerned. It should be noted that all these categories of staff may not exist as separate individuals, e.g., an integrated health worker may well fulfill the functions of a leprosy paramedical worker in an integrated programme.



Recommended activities

At the time of leprosy diagnosis all patients should be examined for lagophthalmos (any gap in mild closure), visual acuity, the red eye, and presence of a facial patch. All people with lagophthalmos, decreased vision, persistent red eye, and/or a facial patch in reaction should be referred by the basic health worker to a higher level for clinical evaluation, or as per guidelines in the national leprosy control and prevention of blindness programmes.

At the end of anti-leprosy treatment all patients must be educated regarding the risk of eye disease and informed that they should return for examination if they develop lagophthalmos, diminished vision, a red eye, or a facial patch in reaction.

Explicit instructions regarding referral must be given to each discharged patient. All patients with lagophthalmos should receive continued periodic follow up.

In settings where there are leprosy colonies/villages it is recommended that annual (as a minimum) screening eye examinations and treatment be conducted. Furthermore, patients in 'care after cure' programmes should have, as a minimum, annual eye care examinations and management.

There are many barriers that prevent patients from accepting lagophthalmos surgery or for accepting cataract surgery, which need to be identified. They can be broken down sequentially, as follows:

- **Awareness** (knowledge of the availability of surgery, the surgical location, the cost of surgery, and the anticipated outcome of surgery)
- **Accessibility** (affordability of surgery, distance to surgical facility, provider acceptance of leprosy patients, quality of surgical outcome)
- **Acceptance** (family willingness to support surgery, family willingness to provide assistance to seek surgery, fear of surgery, fear of a poor outcome)

Information on specific barriers is important to properly promote cataract and lagophthalmos surgery to patients and their families. The barriers will be different for lagophthalmos and cataract, and will be different for men and women. Promotion activities need to be gender-sensitive.

Disability grading in leprosy

There have been many revisions to the WHO leprosy disability grading scheme; the current WHO grading scheme for eye disabilities is impractical for most programmes and is rarely implemented. Accordingly, it is recommended that visual acuity (either visual impairment [visual acuity <6/18] or blindness [visual acuity <6/60], depending upon the setting) and lagophthalmos should become the primary indicators for monitoring disability (grade 2) and that corneal hypoesthesia, corneal opacities, and uveitis should be removed from the leprosy disability grading scheme. These latter conditions are more difficult for health workers to detect reliably, although an ophthalmologist may consider them in determining appropriate treatment for a given patient.

CHAPTER 4

TRAINING PERSONNEL IN PREVENTION & MANAGEMENT OF EYE DISEASE IN LEPROSY

Standard manuals for training integrated health workers and others in the adopted guidelines are being prepared. Resources need to be identified for training these workers in eye problems, and to educate patients and their families about blinding eye lesions. Much can be incorporated into present training schemes and existing education establishments can be used for health worker and patient education.

The target groups for education in relation to ocular leprosy are:

1. The 'decision makers', such as the Minister of Health, the leprosy policy-making committee, and programme managers
2. The 'opinion shapers', such as community and religious leaders, and educational establishments, including medical schools
3. Integrated health workers, leprosy health staff and ophthalmic workers at all levels
4. Patients, ex-leprosy patients and their families.

To all these groups the clear message should be given that:

- Leprosy can be a serious disease for the eye; people with leprosy should have equal access to general eye care services
- MDT is an effective treatment for leprosy and it will greatly reduce the risk of leprosy associated blindness
- When eye complications develop in spite of MDT, these can almost always be treated to prevent blindness
- Early recognition and management will lead to the best outcome.

Integrated health workers

a. Background

Integrated health workers in leprosy endemic countries are often responsible for 5,000 to 25,000 people, amongst which there may be 5 or fewer leprosy or ex-leprosy patients. These workers have health related responsibilities for a local area, but limited knowledge of leprosy.

Most leprosy or ex-leprosy patients do not need to be seen by an ophthalmologist or specialized eye worker (ophthalmic assistant or ophthalmic nurse). Fortunately, many of the clinical signs of ocular leprosy are symptomatic.

Active screening, basic care and referral by integrated health workers or other trained non-ophthalmic health staff can significantly reduce the levels of ocular morbidity and blindness amongst leprosy patients.

For inclusion in a programme for integrated health workers, only those clinical signs that can be easily detected and that lead to blindness need to be identified.

b. Tasks

Integrated health workers (IHWs) will be expected to recognise major signs of ocular leprosy (listed on the next page), to provide primary (emergency) care, to refer patients in need of further examination or treatment and follow-up cases on ophthalmological treatment. A strong supervision and referral network are vital in the implementation of this programme. IHWs should:

- recognise leprosy as a health problem
- recognise that leprosy causes blindness
- educate patients and their families about leprosy and its blinding complications
- know who their referral persons are and refer all eye problems among leprosy patients to this level
- help reduce resistance by eye health staff to treat eye diseases of leprosy patients
- know patients under therapy and ex-leprosy patients
- know how to administer eye drops
- teach patients and family members how to instill eye drops and monitor their application
- know how to measure visual acuity, examine for lagophthalmos and the red eye, and recognize a facial patch
- know how to elicit symptoms and information on quality of life from the patient and family
- know how to promote surgical intervention

Figure 1



Figure 1: Ectropion of both lower eyelids (photo by M. Brand).

Figure 2

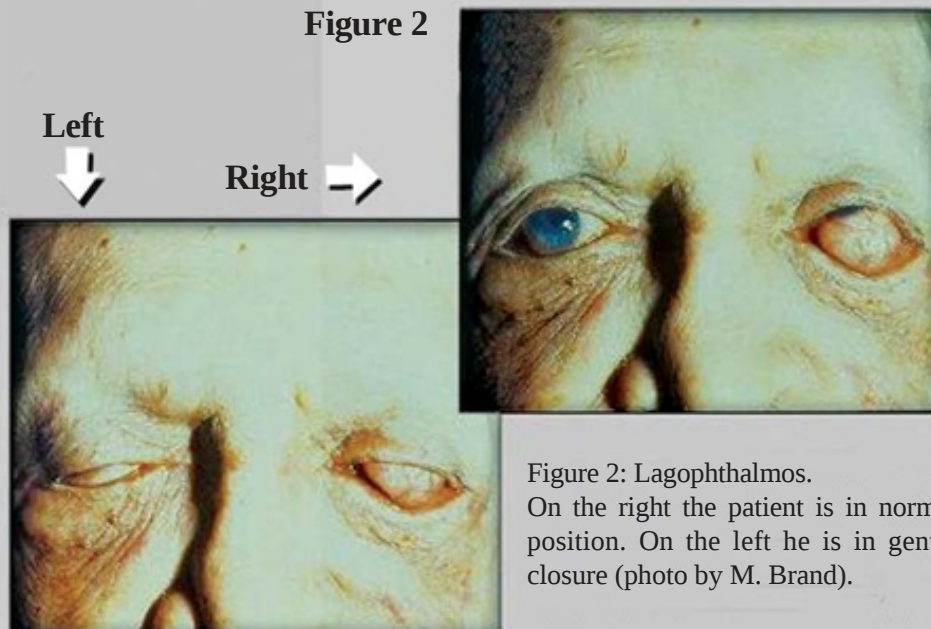


Figure 2: Lagophthalmos.
On the right the patient is in normal position. On the left he is in gentle closure (photo by M. Brand).

Figure 3

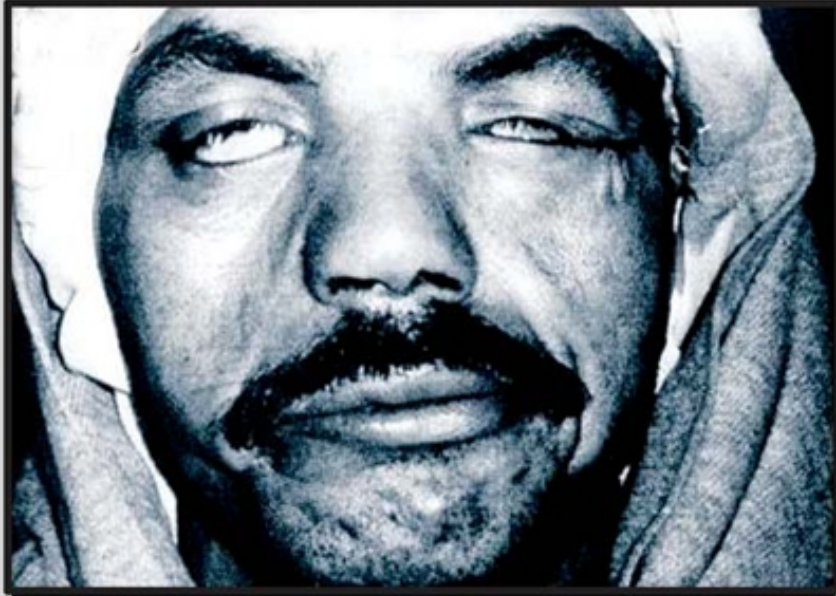


Figure 5: Patient with Lagophthalmos. He has been asked to close forcefully, but still has a gap visible on both sides. Worse on the right than on the left (photo by P. Courtright).

Figure 4



Figure 4: Cataract in both eyes. Note the white pupils. (This is not a PAL) (photo by ICEH).

Figure 6: Large facial patch over left zygoma. This patient has a high risk for developing lagophthalmos in the left eye. (photo by M. Hogeweg).

Figure 6



Figure 5



Figure 5: Trichiasis (photo by Massae).

Figure 7



Figure 7: Acute iridocyclitis in Leprosy. The affected right eye shows a smaller pupil and circumcorneal vascular dilation (photo by M. Brand)

Figure 8

Figure 8: Advanced punctate keratitis, which has characteristically started at the corneoscleral junction of the superior



temporal quadrant (photo by M. Brand).

Figure 9



Figure 9: Episcleritis in Leprosy (photo by M. Brand).

Figure 10



Figure 10: Chronic iridocyclitis (photo by M. Hogeweg).

Major signs of ocular leprosy to be recognized by an Integrated Health Worker

Clinical sign	Diagnostic criteria	Therapeutic intervention
<u>Visual acuity</u>		
Visual impairment	< 6/18	Refer, if causing reduced visual function/quality of life
Severe visual impairment	< 6/60	Refer
Blindness	< 3/60	Refer
<u>Facial patch</u>	Red & raised patch on the face	Refer
<u>Lagophthalmos</u>		If present for < 6 months: refer for steroid treatment
Gap on gentle closure, as in sleep	Lids drift open	Exercise, and eye ointment at night; refer
Gap on forced closure	Globe exposed	Protect cornea; use eye ointment; refer
<u>Trichiasis</u>	Lashes rubbing on globe, with irritation	Apply ointment and refer
<u>Red eye</u>		
Discharge - clear cornea		Clean; antibiotic eye ointment
Pain and photophobia		Refer

Additional cases to be referred to the secondary level of eye care are those with no response to topical antibiotic therapy.

c. Training

IHWs should be trained by their supervisors, leprosy paramedical workers, or ophthalmic assistants where possible. Training should be performed both at the health centre and in the field. Initial training would require one day at the health centre or district hospital. Periodic field supervision is essential, the IHWs accompanying their leprosy supervisors during their scheduled visits to the patients. The cost of this training should already be contained within the structure of integrated health worker training. Appropriate training aids may include learning boards and recognition cards, and the workers should examine normal eyes.

d. Equipment and supplies

Equipment and supplies for examination include:

- card or chart for visual acuity testing
- torch
- tetracycline (or other antibiotic)
- corneal protection devices (e.g.: tape and eye shades)

Paramedical worker in leprosy

a. Background

In some settings, paramedical workers in leprosy (PMW) are responsible for over 100 leprosy patients. They have extensive training in leprosy while they usually have little training in eye care. The PMW is generally responsible to a medical officer. As full-time leprosy workers, the PMWs can assume responsibility for management of cases of ocular leprosy, provided they receive appropriate training.

b. Tasks

The PMW will educate the patient and family about the dangers of eye complications of leprosy and about preventive measures. Upon completion of training, the PMW should be able to perform the diagnostic and therapeutic tasks listed on the next page.

c. Training

The PMWs should be taught, as part of their general training in leprosy control, by a medical officer with extensive ophthalmic experience, an ophthalmic assistant, or by an ophthalmologist with experience in leprosy. In certain African and other countries the ophthalmic medical assistants or clinical officers may be responsible for this training. The training is best conducted in a setting where leprosy patients are treated. The initial training course, conducted over a 3-day period, should consist of lectures and practical clinical exposure. Yearly refresher sessions should then update this information. Both phases of training need to be integrated within existing leprosy training programmes. Training aids should include task-oriented manuals, posters, flip-charts and booklets and, where possible, videos, slides, and 'model' eyes. In addition, training teams should accompany the PMWs for supervision in the field.

d. Equipment

Equipment for examination and therapy include:

- card or chart for visual acuity testing
- pinhole (if trained in use)
- torch and loupe (magnifying lens)
- tetracycline (or other antibiotic)
- cotton-wool (for testing corneal sensation)
- short-acting mydriatic (phenylephrine 5%)
- corneal protection devices (e.g. sunglasses)

**Major signs of ocular leprosy to be recognized by an
Paramedical Worker in Leprosy**

Clinical sign	Diagnostic criteria	Therapeutic intervention
<u>Visual acuity</u>		
Visual impairment	< 6/18	Refer, if causing reduced visual function/quality of life
Severe visual impairment	< 6/60	Refer
Blindness	< 3/60	Refer
<u>Facial patch</u>	Red & raised patch on the face	Refer
<u>Lagophthalmos</u>		If present for < 6 months: refer for steroid treatment
Gap on gentle closure, as in sleep	Lids drift open	Exercise, and eye ointment at night; refer
Gap on forced closure	Globe exposed	Protect cornea; use eye ointment; refer
<u>Trichiasis</u>	Lashes rubbing on globe, with irritation	Apply ointment and refer
<u>Cornea</u>		
Surface	Dull or rough	Ointment and refer
Sensation	Diminished	Ointment; blinking exercises Protective (sun)glasses Patient instruction Refer corneal damage
<u>Red eye</u>		
Discharge - clear cornea		Clean; antibiotic eye ointment
Pain and photophobia		Refer

Ophthalmic assistant or ophthalmic nurse

a. Background

In many leprosy endemic countries ophthalmic assistants or ophthalmic nurses are the backbone of eye care services in rural areas. Their training often includes surgery for extra-ocular conditions (e.g., bilamellar tarsal rotation procedure for trichiasis) but not for intra-ocular conditions (e.g., cataract). In most settings their training in management of eye conditions of leprosy is either insufficient or non-existent. Standard curriculums which include cosmetically acceptable management of lagophthalmos, referral procedures for other conditions, and training and supervision of IHWs are needed. Promotion of integration of leprosy patients within district/regional VISION 2020 programmes should also be included.

b. Tasks

The ophthalmic assistant may be the most appropriate person to train and supervise IHWs in diagnosis and basic primary eye care management. Ophthalmic assistants should also assist in encouraging the use of eye care facilities by leprosy patients and help to reduce the stigma associated with leprosy. Furthermore, the ophthalmic assistant should be prepared to do simple surgical correction of lagophthalmos and trichiasis. In both cases, it is important that the outcome of surgery should be monitored.

c. Training

Ophthalmic assistant training curriculums, although generally well-developed, have minimal information on managing eye disease in leprosy patients and no information on training and supervision of IHWs in their activities. It is critical that these curriculums be updated to include relevant sections on eye care in leprosy. Furthermore, ophthalmic assistants need training in procedures, other than the cosmetically unacceptable tarsorrhaphy, for correction of lagophthalmos and ectropion. Monitoring of the outcome of surgery, currently not part of ophthalmic assistant training programmes, needs to be included.

Ophthalmologist

a. Background

The ratio of ophthalmologists to the population in most leprosy endemic countries is very low; in addition, most ophthalmologists are located in urban areas, far distant from most leprosy and ex-leprosy patients. It would be most helpful if regional or national referral ophthalmologists were identified for leprosy control programmes. There are standard recording forms (Annex 4) for clinical examination in leprosy, which may be helpful in monitoring ocular conditions in these patients. Some ophthalmologists may wish to add other ocular signs to the form.

b. Tasks

The primary role of the ophthalmologist in management of eye disease in leprosy is to be the tertiary referral for patients in need of more detailed examination and in need of surgical intervention. In some settings well-trained cataract surgeons can provide IOL implantation surgery to non-complicated cases. Ophthalmologists who conduct outreach eye care services should include leprosy settlements in their annual schedule.

c. Training

Ophthalmologists and other relevant surgeons need to be trained in good quality lagophthalmos and cataract surgery. Training should include monitoring of the outcome of surgery.

CHAPTER 5

RESEARCH NEEDS IN OCULAR LEPROSY

Epidemiological research

Epidemiological research is important in elucidating risk factors for ocular morbidity and blindness from leprosy. Findings from the Longitudinal Study of Ocular Leprosy (LOSOL) and other studies are answering some of the questions related to demographic and clinical characteristics of leprosy that influence the development of ocular lesions during MDT. Continued follow up of these study subjects after completion of MDT would help elucidate the progression of ocular disease and vision loss; this information is important to help determine which patients require long-term active ophthalmologic follow up. Additional research into the contribution of local production of antibodies, genetic variations and reactions (ENL and reversal reactions) to ocular pathology would also be useful. Current research from the LOSOL study cohort provides information about patients who have undergone two years of MDT; there is no information on how a shortened duration of MDT affects the incidence of eye disease.

At a national or regional level in leprosy endemic countries it is important that epidemiologic methods be used to assess the eye care needs of the leprosy (and ex-leprosy) population. This information, if gathered in a standardized fashion, can be used for prioritizing eye care activities within and between areas. Prevalence information, when combined with information on utilisation of services, barriers to use, and socio-demographic data, can also be essential for identifying the specific activities required for reducing the risk of disabling and stigmatizing ocular conditions. While the LOSOL study set up standard criteria for data collection, there are still areas of difficulty, principally in the assessment of corneal sensation.

Different epidemiological methods (cross-sectional studies, longitudinal studies, case-control studies, and clinical trials) are needed for different questions. For example, there is still a need for conducting a clinical trial of different procedures for surgical correction of lagophthalmos (and co-existent conditions such as ectropion and reduced corneal sensation).

Operational research

Operational research is concerned with the application of scientific methods, techniques and tools to find solutions to problems that may arise in the operations of a system. It provides to those managing a health system alternative strategies to improve effectiveness. Prevention of blindness from leprosy, like the control of leprosy itself, involves a complexity of medical, social, and economic problems.

Considerable planning and analysis would need to be undertaken to achieve the stated objectives for control, having time and quality parameters, and being accomplished with optimum benefit in relation to costs. Operational research and systems analysis thus provide tools to optimise the strategies for prevention of blindness due to leprosy as well as the prevention of blindness due to other causes in leprosy and ex-leprosy patients. The three main activities in the management of eye conditions in leprosy are 1) case detection, 2) treatment, compliance, monitoring, and surveillance, and 3) health education.

The following operational research topics are of particular importance:

Case detection

What are the critical signs that integrated health workers must recognize in order to ensure that most patients at risk of vision reducing eye disease are found in a timely fashion?

What degree of lagophthalmos should signal to health workers the need to encourage patients to seek ophthalmologic assessment?

Is there a gender bias in case detection in leprosy and does this influence prevalence or incidence of complications?

Treatment, compliance, monitoring, and surveillance

Routine monitoring of lagophthalmos surgery is critical to decision making regarding surgical procedures, quality of surgery, and post-operative care. Systems for routine monitoring of lagophthalmos surgery are needed. Routine cataract outcome assessment programmes are needed wherever leprosy patients are receiving cataract surgery. In particular, data on the outcome of IOL implant surgery in complicated cataract cases is needed. There are considerable barriers preventing use of surgical services (lagophthalmos and cataract): these need to be assessed locally and nationally to develop practical programmes to promote acceptance of surgery.

Most research into surgical treatment includes only clinical outcomes. It is important to include patient assessment of outcome, particularly for conditions such as lagophthalmos and ectropion.

Research is needed into determining the best indicators for monitoring programme efficiency, effectiveness, and sustainability.

Health education

'Think-blink' is routinely recommended as an activity for individuals with mild lagophthalmos and impaired corneal sensation. While it seems intuitively useful, there is no evidence of its effectiveness. This activity should be evaluated both from the perspective of patient acceptance and efficacy. It is suggested that blinking exercises will reduce lid gaps by 1-2 mm, by strengthening the orbicularis, but efficacy has not been tested.

Study of the skills necessary within the health system (at all levels) is needed to help refine job descriptions and training activities.

Basic research

There is evidence that *M. leprae* reaches the eye predominantly via the blood stream. The clinical ocular manifestations may be secondary to nerve involvement, either from direct infiltrative lesions or as a result of cellular immune response in the tissues. Basic histopathologic research has been hampered by:

The paucity of material that can be obtained from the human eye and the adnexal structures at any stage of the disease

The lack of centres and trained personnel whose special interest is research in ocular leprosy at places where the clinical material is available

The loss of valuable material, discarded from surgical procedures.

Anterior uveitis, both acute and chronic, is a clinical problem that is potentially sight threatening. There are, however, few immunopathological studies to substantiate the general view that the acute ocular reactions are mediated by immune reactions or that chronic uveitis is the end-result of multiple, low-grade episodes of acute uveitis.

EXECUTIVE SUMMARY

Guidelines for the management of eye care in leprosy: Recommendations from an ILEP supported meeting

July 3-5, 2001
Broxbourne, UK

Multidrug therapy (MDT) has greatly reduced the incidence of eye disease in leprosy. Nevertheless, people who are affected by leprosy or who have previously had leprosy, continue to have eye complications as a result of the disease or as a result of other causes, such as cataract.

Recent research has shown that at the time of their leprosy diagnosis approximately 10% of people with multibacillary (MB) leprosy have lagophthalmos, uveitis, or trichiasis related to their disease. Cataract related vision loss is higher in leprosy patients than in the general (age-matched) population. During MDT, around 2% of MB patients develop lagophthalmos and 7% develop uveitis. Research on the incidence of ocular disease following completion of MDT suggests that uveitis may still develop. The prevalence of eye disease in patients released from treatment (cured patients) varies considerably, primarily as a result of previous anti-leprosy treatment.

In many settings there are significant barriers preventing the use of eye care services by leprosy patients, either during or after anti-leprosy treatment.

Globally, leprosy control programmes have become more integrated into general health care services. At the same time, our understanding of eye disease in leprosy has increased. These two developments have highlighted a need for revising global prevention of blindness guidelines. The quality of eye care received by those affected by leprosy should at least equal the quality available to other people; therefore it is to the benefit of leprosy patients that general eye care programmes are supported. Based on our current knowledge of eye disease in leprosy and upon the changing structure of leprosy control programmes, the following recommendations for eye care management in leprosy are proposed:

1. It is critical that leprosy patients (during their anti-leprosy treatment and after release from treatment) are accepted into general health and eye care programmes. Integration will require close collaboration between leprosy control and prevention of blindness programmes. At national, regional, and local levels, strong political commitment (including professional organisations) is needed to integrate leprosy patients into general health and eye care programmes.
2. Integration of leprosy and eye care will reinforce and complement VISION 2020 initiatives and strengthen leprosy control activities.
3. Cataract is the leading cause of blindness in leprosy affected persons and many do not have access to general eye care services. All persons affected by leprosy should have equal access to general eye care services. Education of health workers (including eye care staff) is required to ensure that leprosy patients gain access to eye care facilities.
4. Visual acuity and lagophthalmos should become the primary indicators for monitoring disability. Corneal hypoesthesia, corneal opacities, and uveitis should be removed from the leprosy disability grading scheme.
5. At the time of disease diagnosis all patients should be examined for lagophthalmos (any gap), visual acuity, a red eye, and the presence of a facial patch. All people with lagophthalmos, decreased vision, persistent red eye, and/or a facial patch in reaction should be referred by the peripheral general health worker to a higher level.
6. At the end of anti-leprosy treatment all patients must be educated regarding the risk of eye disease and informed that they should return for examination if they develop lagophthalmos, diminished vision, a red eye, or a facial patch in reaction. All patients with lagophthalmos should receive continued follow up. Explicit instructions regarding referral must be given to each discharged patient.
7. A training component that addresses the skills and activities of health workers in relation to care of eyes in leprosy should be introduced into national plans. The plan should address the needs at different levels and should include the needs of existing health workers through supplementary courses and of health workers currently in training through medical, nursing and paramedical curriculums. In every setting with a leprosy control programme, a practical referral system needs to be clearly defined. All staff at referral points need to be educated regarding the eye care needs of leprosy patients.

8. In settings where there are leprosy colonies/villages, it is recommended that annual (as a minimum) screening eye examinations and treatment are conducted. Furthermore, patients who have completed MDT but still suffer from the consequences of the disease should have, as a minimum, annual eye care examinations and management.
9. Lagophthalmos surgery should be provided to patients who need it. Evaluation of the need for lagophthalmos surgery should be based on one or more of the following conditions: size of lid gap, corneal exposure, corneal hypoaesthesia, visual acuity, and/or cosmetic difficulties. There are a number of surgical procedures being used for lagophthalmos surgery. Research is needed to determine the best possible surgical procedures to correct lagophthalmos and to improve functional and cosmetic outcomes. Standardised routine monitoring of the outcome of lagophthalmos surgery is recommended. There are many barriers that prevent patients from accepting lagophthalmos surgery, which need to be identified; programmes need to be developed to increase the uptake of lagophthalmos surgery. Finally, ophthalmologists and other relevant surgeons need to be trained in good quality lagophthalmos surgery.
10. Research shows that cataract surgery with IOL implantation, even in patients with evidence of chronic uveitis, can provide good quality outcomes. IOL implantation, where available, should be promoted among leprosy patients who need cataract surgery. The outcomes of cataract surgical services need to be routinely monitored in all patients.

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Annex 1: List of participants

Annex 2: Lagophthalmos form

Annex 3: Modified lateral tarsal strip procedure

Annex 4: Standardized clinical examination

Annex 1: Eye Care Workshop Participants

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Annex 2: Lagophthalmos/Ectropion Surgery Outcomes Assessment

Patient Enrolment & Pre Operative Form

Patient Name: _____ Patient Number: _____

(family, given)

Date of Surgery: ____/____/____ Surgeon: _____ Location: _____

Mo. Day Yr.

City & country of surgery

Demographics

1. Date of Birth: ____/____/____ 2. Patient Gender: 3. Village of residence 4. Township of residence:
Mo. Day Yr. ☐ Male ☐ Female

Clinical Information

5. Primary patient complaints:
(check all that apply)

- ☐ Tearing
☐ Blurred Vision
☐ Pain
☐ Disfigurement
☐ Foreign Body sensation

6. Other vision reducing pathology:

- ☐ Chronic uveitis
☐ Cataract
☐ Other

7. Duration of lagophthalmos:

years

8. Visual acuity:

- (a) Presenting
(b) Corrected or with pinhole

Right Eye

Left Eye

9. Facial patch involving the malar region:

- ☐ +
☐ -
☐ Unknown

- ☐ +
☐ -
☐ Unknown

10. Drooping of the mouth:

- ☐ + ☐ -

- ☐ + ☐ -

11. Condition of the lids:

- (a) Exposure of globe (open gaze)
(b) Exposure of globe (with gentle closure)
(c) Exposure of globe (with forced closure)
(d) Ectropion of lower lid

- mm
 mm
 mm
☐ Severe
☐ Moderate
☐ Mild
☐ None

- mm
 mm
 mm
☐ Severe
☐ Moderate
☐ Mild
☐ None

12. History of previous lagophthalmus surgery
If yes, type of surgery

- ☐ + ☐ -

- ☐ + ☐ -

13. Ectropion of lacrimal puncts:

- ☐ + ☐ -

- ☐ + ☐ -

14. Trachomatous trichiasis:

- ☐ + ☐ -

- ☐ + ☐ -

15. Cicatricial trachoma:

- ☐ + ☐ -

- ☐ + ☐ -

16. Condition of the cornea:

- (a) Exposure keratitis
(b) Corneal hypesthesia
(c) Corneal opacity not involving visual axis
(d) Corneal opacity involving visual axis (e)
Diagram of corneal opacity

- ☐ + ☐ -
☐ + ☐ -
☐ + ☐ -
☐ + ☐ -

- ☐ + ☐ -
☐ + ☐ -
☐ + ☐ -
☐ + ☐ -

 Extent of opacity



Patient Name: _____ Patient Number: _____

Surgery	
Surgery: ☐ Tarsal strip/horizontal shortening of lateral edge of lid ☐ Temporalis muscle transfer ☐ Lid suspension ☐ Tarsorrhaphy ☐ Other	Surgical complications: ☐ Overcorrection _____ ☐ Undercorrection _____ ☐ _____ ☐ None
Surgeon Name _____ : ☐ Ophthalmologist ☐ Team leader ☐ Other	
Clinical History of Leprosy (from patient file)	
Age at leprosy diagnosis: Duration between leprosy diagnosis & onset: (in months)	Leprosy type: Ridley-Jopling System: ☐ LL ☐ BL ☐ BB ☐ BT ☐ TT Simplified: ☐ MB ☐ PB
Leprosy chemotherapy: ☐ Prior history of dapsone monotherapy ☐ MDT only	Compliance to regimen: ☐ Compliance good (define: _____) ☐ Compliance poor (define: _____)
MDT regimen included: ☐ Rifampicin Duration _____ months ☐ Clofazimine Duration _____ months ☐ Other: Duration _____ months	Current status: ☐ Dapsone alone ☐ MDT ☐ Released from treatment (year of release _____) ☐ Other ☐ None
Steroid use: ☐ Reported ☐ Not reported	
History of reactions: ☐ No reactions (Type I or Type II) reported ☐ Type I reaction reported (year of last reported reaction _____) ☐ Type II reaction reported (year of last reported reaction _____)	

Annex 3: Steps in the modified lateral tarsal strip procedure

1. Inject local anesthetic (3-5 ml of xylocaine, 1% or 2 %) into the lateral part of both upper and lower lids. Clean and drape the area with a sterile drape. Instill one drop of topical anesthesia in the eye.
2. With scissors, make a cut to separate the upper from the lower lid (a lateral canthotomy). **(Figure 1)**
3. Direct the scissors downwards and laterally to cut the lower part of the lateral canthal tendon, thus separating the lower lid from its attachment to the bone (the lateral orbital rim). One or two cuts may be necessary to free the lower lid completely. **(Figure 2)**
4. Pull the lower lid laterally and upwards in the desired position so that the lower lid margin covers the lower part of the cornea by about 1-2 mm. There will be a slight relaxation after the surgery so mild overcorrection is required.
5. Mark the excess skin (a triangular- shaped piece) and cut it off with scissors. **(Figure 3)**
6. Use the tarsus at the lateral end of the lower lid to fashion a new ligament (lateral tarsal strip). This is done by removing of the overlying skin and muscle, cutting away the lashes and their follicles, and scraping off the conjunctiva on the back surface of the tarsus. **(Figures 4 & 5)**
7. Suture the newly fashioned strip to the periosteum of the lateral orbital wall using a 5/0 suture (a non-absorbable suture like ethibond is preferred over absorbable materials). **(Figure 6 a,b,c)**
8. Use the same suture (several interrupted sutures) to close the layers of skin and muscle making up the new lateral canthus. **(Figure 7)**
9. Throughout the procedure, bleeding can usually be controlled with pressure. Using epinephrine 1:100,000 mixed with the local anesthetic will markedly reduce the bleeding . The eye can be patched for 24 hours if needed.

Figure 1

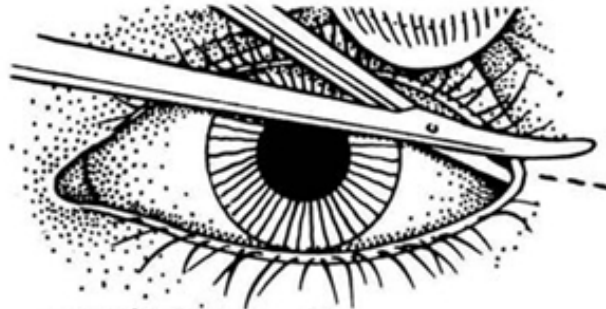


Figure 2

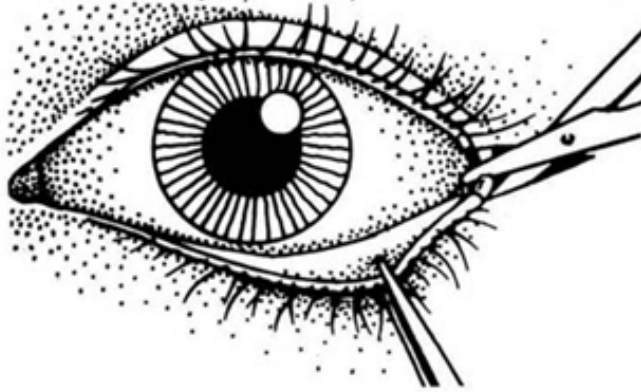


Figure 3

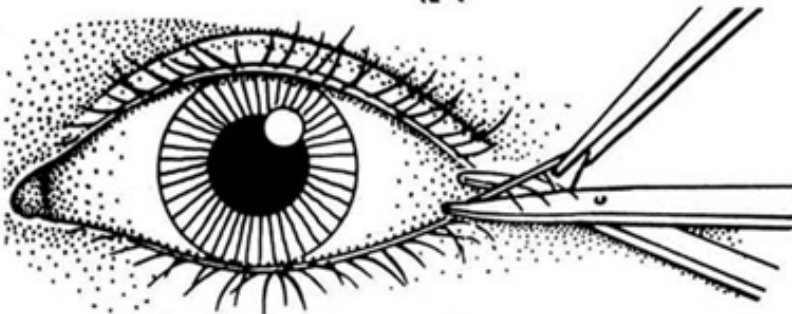
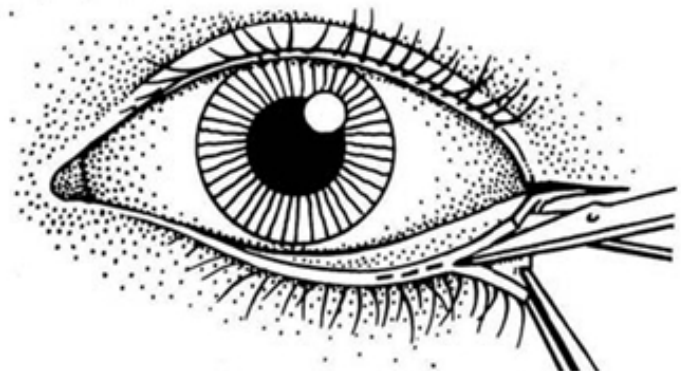


Figure 4



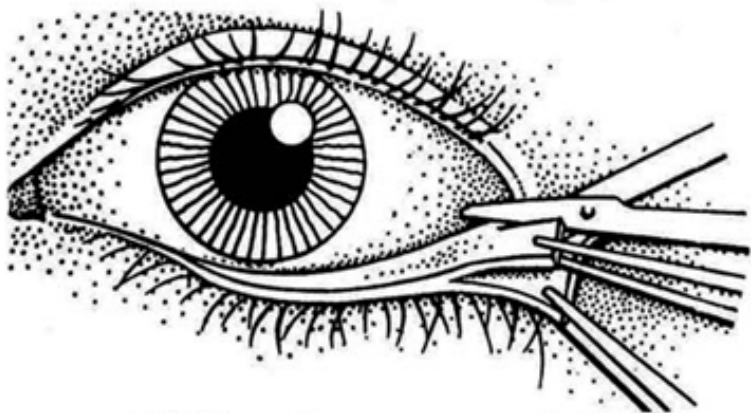


Figure 5

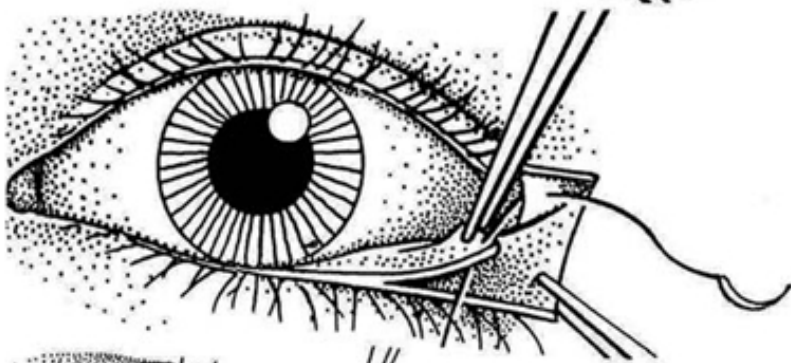


Figure 6a

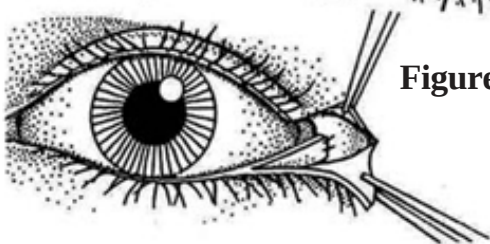


Figure 6b

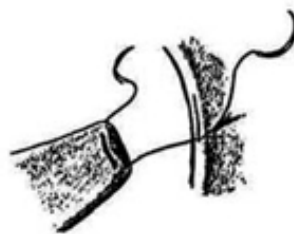


Figure 6c

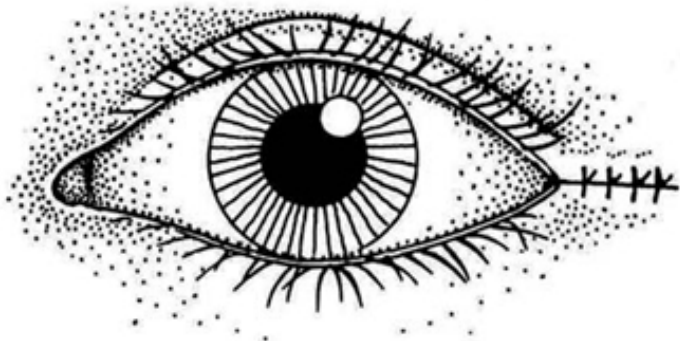


Figure 7

Annex 4: Standardisation of Clinical Examination

It is recognised that there is a multiplicity of lesions in ocular leprosy, but only those that threaten sight and are amenable to preventive measures or therapeutic intervention are considered here. The examination consists of the measurement of visual acuity and the objective examination of the various components of the face, lids and the eye that may be affected in the disease.

VISUAL ACUITY MEASUREMENT

Visual acuity should be measured and recorded in each eye independently using standard optotypes. Cases with visual acuity of less than 6/18 should be evaluated with correction or pinhole vision. The visual acuity should be sub-divided into four entities:

1. Satisfactory vision defined as visual acuity of 6/18 or better
2. Visual impairment defined as visual level less than 6/18 but equal to or greater than 6/60
3. Severe visual impairment or moderate blindness (less than 6/60 but equal to or greater than 3/60)
4. Severe blindness defined as visual acuity less than 3/60.

FACE

Pale flat maculae: reversal reactions in the face, with red and raised lesions.

LIDS

Abnormalities of function and lid deformity should be evaluated:

1. Lid closure (unforced). Ask the patient to close the eyes as in sleep and maintain the position for ten seconds - assess unforced closure. Measure (in mm) the lid gap.
2. Lid closure (forced). Ask the patient to close the eyes with force and maintain the position for ten seconds - assess forced closure. Measure (in mm) the lid gap.
3. Blink pattern. Incomplete and/or asymmetric blinking should be recorded.
 - a. Normal
 - b. Incomplete and/or asymmetric
4. Lid deformity: should be evaluated by recording the presence of.
 - a. No deformity
 - b. Ectropion - eversion of the lid margins
 - c. Entropion - inversion of the lid margins
 - d. Trichiasis - one or more eyelashes rubbing on globe
 - e. Dermatochalasis
5. History of previous lid surgery

DISCHARGE

The presence or absence of discharge in the conjunctival sac should be noted (additionally, if increased by pressure on the lachrymal sac):

- a. No discharge
- b. Discharge: unchanged with pressure
- c. Discharge: increased with pressure

ACUTE RED EYE

The following differentiation should be made:

- a. No red eye
- b. Conjunctivitis - characterised by peripheral diffuse redness, discharge, mild discomfort; vision unaffected
- c. Episcleritis or scleritis - characterised by a focal redness and tenderness with vision unaffected
- d. Corneal ulcer or abrasion - characterised by haziness or opacity of cornea with focal redness and pain; positive fluorescein staining; vision affected
- e. Iridocyclitis - characterised by circumcorneal redness, pain, photophobia, with no stickiness, small pupil; blurred vision
- f. Acute glaucoma - characterised by pain, redness, corneal haze, fixed dilated pupil, hard eye, no stickiness; severely reduced vision.

CORNEA

Evaluation of sensation and the presence or absence of corneal opacities should be undertaken. Normal sensation is indicated by an involuntary blink when the centre of the cornea is touched with a wisp of cotton-wool.

1. Sensation is either:
 - a. Normal, or
 - b. Diminished
2. Opacities - these should be graded according to their effect on central vision:
 - a. No opacities
 - b. Generalised dullness (dull or rough) of the cornea; pupil visible
 - c. Central opacity; pupil partially visible
 - d. Opacity through which there is no view of the pupil
 - e. Peripheral opacity, central cornea clear
 - f. Corneal or limbal leproma or nodule

PUPIL

The iris and pupil reaction should be examined in subdued light and the following signs recorded:

1. Pupil size
 - a. Normal and reacting
 - b. Constricted and non-reacting
 - c. Dilated
2. Pupil shape
 - a. Regular
 - b. Irregular (posterior synechiae)
3. Colour of pupil
 - a. Black
 - b. Grey or white (indicating cataract with visual acuity $<6/18$)
4. History of previous cataract surgery

GLOBE

- a. Normal
- b. Hard eye (digital palpation)
- c. Soft eye (digital palpation)
- d. Staphyloma
- e. Shrunken eye (phthisis) (regardless of intraocular pressure)
- f. Absent eye