THE ROUND TABLE covered two principal topics: first, external diseases of the eye, especially in relation to infection and to lid and conjunctival lesions; and, second, growth and development of the eye with stress upon eye movements, refractive errors, and strabismus.

External diseases of the eye are often primary, but pathology in this area frequently is found to reflect systemic illness.

LID

Various glands of the lid were defined and the pathology of each reviewed. In the fibrous tarsal portion of the lid lies the Meibomian gland, the sebaceous secretion of which prevents the spillage of tears and protects the lid margin. The acute inflammation is usually staphylococcal, and tends to persist to produce a granuloma surrounded by fibrous tissue. A chronic chalazion consists of round, epithelial and giant cells without acid-fast organisms. Heat may be useful initially in the acute stage; however resolution is slow and usually terminates in a hard, persistent nodule. The removal of the chronic chalazion is by curettage.

The glands of Zeiss are the sebaceous glands for the lash follicles. By contrast, infection of these results in a self-limited disease, hordeolum or stye, which drains itself spontaneously or may require local incision. Rarely are there complications following a hordeolum. Some individuals are more susceptible to repeated infections, and prevention remains an unsolved problem.

The sweat glands of the lid, or glands of Moll, may form simple cysts on the lid margins which rupture easily.

The lacrimal glands in the upper part of the lid are seldom involved in an inflammatory process, except occasionally in mumps or sarcoid.

Herpes simplex of the lid, consisting of a vesicle which crusts and then heals, is often seen with concomitant mouth lesions. Involvement of the conjunctivae is also seen.

Herpes zoster may affect the lid when it involves the first division of the trigeminal nerve. Intraocular involvement usually follows skin manifestations on the tip of the nose. Topical use of adrenal steroids is sometimes employed in the treatment of herpes zoster. Varicella is closely related or may be due to the same virus as herpes zoster; it also produces vesicles on the conjunctivae, but these usually resolve themselves without any sequelae.

Chronic marginal blepharitis is of two types. The first is that accompanied by seborrheic dermatitis and manifested by flakes of dandruff-like material on the lid margin. In addition, there is a secondary-infection type usually due to staphylococcus, and with this marginal ulcers appear. The squamous blepharitis responds to local selenium-sulfide preparations, whereas antibiotics are useful in ulcerative blepharitis.

CONJUNCTIVA

Acute purulent conjunctivitis is less frequent in present times than formerly, and this is probably due to antibiotics. Gonococcal conjunctivitis is extremely rare and usually appears as a fulminating ocular or orbital reaction starting on the second or third day of life. Often the appearance is...
in one eye, with rapid spreading to the opposite side. A copious purulent yellow discharge is characteristic, and gangrene of the lids may supervene as the disease proceeds.

Other organisms which produce acute conjunctivitis are meningococci and staphylococci. These two organisms are usually found in older children.

Acute catarhal conjunctivitis may be secondary to Koch-Weeks bacillus (pink eye), staphylococcus, pneumococcus, or Hemophilus influenzae. The discharge is usually mucopurulent. The pneumococcal type often presents with petechial conjunctival hemorrhages. Smear of the discharge and culture confirm the diagnosis.

DR. DIXON (WOOSTER, OHIO): Are there other causes of chronic blepharitis?

ANSWER: Vitamin A deficiency is a rare cause.

DR. DIXON: What about refractive errors?

ANSWER: The speaker is not convinced that any external eye disease is caused by refractive errors.

VOICE: Should chalazion be surgically treated?

ANSWER: In the acute state hot packs may be applied and antibiotics that are effective against staphylococcus may also be used at this time. If an unsightly residual remains, then surgical excision may be necessary. Younger children are usually treated medically for longer periods due to the problems of anesthesia.

VOICE: How important is it to identify the organism?

ANSWER: Very important, especially if antibiotics are to be used.

DR. DIXON: What prophylaxis against gonococci are you using in St. Louis?

ANSWER: Silver nitrate solution or appropriate antibiotics.

DR. GILLESPIE (VICTORIA, B.C.): How long do you leave silver nitrate solution in the eyes?

ANSWER: In vitro it is effective in a few seconds. If left in for 15 to 30 seconds in vivo, silver nitrate is effective in two ways: It coagulates the protein and produces a coagulum; it also has a direct effect on the organism, but perhaps the coagulum is just as important.

Returning then to conjunctivitis, the speaker described the chronic state as being most obvious in the early morning when the lids are adherent with accumulated discharge and the conjunctiva is moderately red. This condition rarely persists, and generally accompanies chronic blepharitis.

Follicular conjunctivitis was subdivided into an inclusion type and the adenovirus type. Inclusion conjunctivitis of the newborn occurs about the fifth day and is characterized by a purulent discharge with numerous monocytes containing inclusion bodies. In addition to the characteristic discharge, there may also be enlargement of the pre-auricular lymph nodes. It is venereal in origin. Topical sulphonamide preparations seem effective. In older children inclusion conjunctivitis is of the “swimming pool” type and is found more commonly in users of private pools than public pools. The difference is probably due to the higher concentration of chemicals in public pools.

Epidemic keratoconjunctivitis is caused by an adenovirus and is characterized by follicles in the conjunctival cul-de-sac and preauricular adenopathy. In addition there are corneal infiltrates which may lead to corneal scarring. There is no proven form of therapy and an astringent such as zinc sulfate was recommended.

Allergic conjunctivitis of three types was discussed. Vernal conjunctivitis, occurring in spring, summer or fall, forms a pseudomembrane over the conjunctival surface. Smear reveals lymphocytes and eosinophils. The incidence of phlyctenular conjunctivitis is decreasing because of our higher economic status. In the past, treatment consisted of hospitalization with increased caloric intake. The involvement of the cornea may proceed to degeneration and ulceration. Recurrence is frequent, so long duration of therapy was emphasized. In contact conjunctivitis of the allergic type, antigen is introduced into the eye by the
finger, causing redness and intense itching. This is rare in children. Topical adrenal steroids and antihistaminics are useful in these allergies.

Discussion of diagnostic procedures and management followed. Dr. Miller emphasized the importance of swabbing the discharge, making a smear directly from swab to slide, rather than smearing with pressure from another slide as in preparing blood smears. A wet-swab technique seems preferable to dry. In managing conjunctivitis, one must remember that it is usually a self-limiting disease; the organisms are only in the superficial conjunctival layers, so that when slough occurs, most of the organisms go with it. Most types can be identified by smear alone. A smear containing eosinophils suggests allergic conjunctivitis, whereas polymorphonuclear leukocytes suggest bacterial infection, and monocytes indicate viral etiology. Pneumococcal conjunctivitis may require culture for verification. Sensitivity studies are desirable before antibiotic treatment is undertaken. Most get along well without antibiotic therapy.

One must bear in mind that the usual untreated case is well by the fifth day. Since most cases do not appear in the office until the second day of illness, antibiotic therapy may shorten duration by only a single day. A simpler measure, such as zinc sulfate solution (½%), provides a moderately bactericidal astringent effect, rarely elicits an allergic reaction, and is pleasant to use. Many "eye drops" must be buffered before they are suitable for application to the eye, for they burn if acid or alkaline; an example is a 6:1 mixture of Zephran® hydrochloride (1:5000) and epinephrine (1:1000), which requires buffering due to the acidic Zephran®. In addition to its soothing properties, this mixture blanches the redness of the inflamed eye. Although boric acid can be used in drops, zinc sulfate is more pleasant.

Dr. Miller was asked whether ointment or drops were preferable. Ointments last longer, but are unsightly and greasy. With fluid medications the only effective drop is the first one; the rest run down the side of the face. Ointments are better localized in the eye. When asked for hints regarding technique of getting medication into the eye, Dr. Miller commented that ointments were easier to use and could be applied to the everted exposed conjunctiva of the lower lid, that brute force by the parent was sometimes necessary to instill it into the cul-de-sac, and that cold drops just out of the refrigerator were exceedingly uncomfortable. If one can start from a point close to the eye, the aim is better. Parenthetically, he added that his secretary had removed such problems from his own practice for she has a "woman's touch" which manages to instill the medication in the proper place.

The advantages of conservative therapy were stressed again. The use of topical antibiotics and their relation to development of sensitivity were emphasized. Dr. Miller urged the use of topical antibiotics that are not given systemically, such as bacitracin. He pointed out that once antibiotic therapy is begun, it must be continued beyond the first few days.

Prevention of contact infection in families was recommended by avoiding spread through hand towels, etc., that are used around the eye. In upper respiratory infections a catarrhal conjunctivitis may develop due to obstruction of the lacrimal duct of the nose. This may be effectively alleviated by nasal astringents.

**Voice:** If one starts using zinc sulfate and is unsuccessful, are further cultures useless?

**Answer:** Zinc sulfate suppresses organisms, but repeat cultures should still be attempted. An early smear will help determine therapy. About 95% of conjunctivitis needs only zinc sulfate.

Following this Dr. Miller emphasized the attendant dangers of topical adrenal steroids. He demonstrated a steroid-induced fungus keratitis following 3 consecutive months of steroid therapy. Ulceration proceeded to perforation, and eventually enucleation of the eye was necessary. A combination of a steroid and an antibiotic is most likely to produce this type of lesion,
which has little action against the offending fungus.

The use of fluorescein was discussed. The liquid preparation has been found to be a good culture medium for pyocyaneus. Infection can be avoided by the use of individual fluorescein-impregnated paper strips, moistened in saline solution just before application to the eye.

**Question:** What therapy is recommended for chemical burns of the eye?

**Answer:** Such injuries may be divided into acid or alkaline. Acid burns tend to be self-limiting, not entering the eye itself, but merely coagulating the protein. In contrast, alkali penetrates within 30 seconds, reaching the anterior chamber promptly, and within 5 minutes has penetrated to the back of the eye. It does not form coagulum, but chemically active soaps. The most effective treatment of acid or alkaline burns is the immediate lavage of the eye with copious amounts of water.

**Question:** What about the effects of smog?

**Answer:** It does produce chronic conjunctivitis, but no therapeutic recommendation can be made.

**Question:** Hydrocarbons?

**Answer:** Water usually removes hydrocarbons. If its use is followed by use of an oily substance like castor oil, the latter will coat the surface and deter adhesions between lid and globe.

**Question:** Ultraviolet-radiation burns?

**Answer:** There is a superficial keratitis and photophobia. Sedation and a drop of 1% pontocaine in each eye is good therapy.

Dr. Miller was then asked about the use of topical anesthetics. He cautioned against their use except for temporary anesthesia. They give satisfactory relief on first administration but are less effective with each re-application. In addition they produce corneal damage with prolonged use and delay wound healing. Foreign bodies or a protective bandage may also contact the eye without arousing the normal protective mechanisms.

Subconjunctival hemorrhages are frequently found without apparent cause. They naturally fade from red to brown and reabsorb spontaneously. Occasionally they are the first manifestations of metastatic disease, e.g., neuroblastoma.

Systemic herpes zoster that involves the tip of the nose may lead to iritis with corneal infiltrates at the periphery. Adrenal steroids are of questionable aid. Herpes simplex often leads to dendritic ulcer of the cornea, which if treated with steroid goes wild. Therapeutic efforts should be directed toward removal of the corneal epithelium, with recognition that recurrence is common.

**Tear Ducts**

Discussion of the management of defective tear ducts followed. Infection is secondary to obstruction, which in some cases resolves itself early. In treating the infection one should culture the discharge which often yields a mixture of organisms. Sulfonamide therapy is frequently useful, but relief of the obstruction is essential. Parents can be instructed to massage toward the nose, creating pressure so that drainage may occur into the nasal cavity. If this is unsuccessful, the lacrimal sac should then be emptied by massaging toward the puncta. Following evacuation, topical sulfonamide may be given. Probing should be delayed if possible until the child is about 1 year of age. Additional therapy may consist of an astringent to shrink the mucosal membrane. Around the age of 18 months, if conservative therapy is unsuccessful, definitive surgery may be indicated. This usually consists of anastomosing the lacrimal sac with the nasal mucosa. Avoidance of long-standing infection is important as the tear sac may be altered by chronic inflammation.

**Question:** What is a good medication to dilate pupils?

**Answer:** 10% Neosynephrine® has the advantage of rapid dilation without cycloplegia. However, it stings intensely upon application. 1% Cyclogyl® is good for pupillary dilation and has a cycloplegic action of only 12 hours.
The remainder of the discussion centered on the development of the eye, its movements and visual acuity.

DEVELOPMENT

The adult eye has an antero-posterior diameter of 25 mm, whereas that of the newborn is 18 mm, a fact which demonstrates that eye development is relatively far along at birth. In contrast with other measurements, the distance from fovea to disc remains constant throughout life. The short antero-posterior diameter is compensated by the increased curvature of the lens and cornea which produces a stronger optical effect. The retinal area is relatively greater than that of the adult, whereas there is relatively little ciliary body and little aqueous secretion.

MOVEMENTS AND VISUAL ACUITY

All infants have poor ability to use their eyes together, therefore, strabismus. Not until they are 6 weeks to 3 months of age do they converge well. Prior to this they use tonic neck reflexes when looking right or left. Myelinization of the optic nerve is complete soon after birth. The foveal area alters slightly as the infant develops, but acuity is poor in early infancy. A rotating-drum technique is useful in assessing visual acuity in infants or in hysterically "blind" adults who manifest a revealing nystagmus when subjected to this test.

At birth the infant has about 2 diopters of hyperopia. This increases to a maximum at 6 to 8 years of age. He has good accommodation to compensate for it. The most normal refraction occurs between the ages of 20 and 30 years. Myopia is normal for age 85 years.

Dr. Miller discussed screening examinations for visual acuity in school age children. The most effective device for screening is the Snellen Chart. Screening techniques tend to pick up more myopic than hyperopic children. A persistent examiner can usually find a visual acuity of 20/20 in a normal 3-year-old child. If children in St. Louis schools do not meet the visual acuity stated below, they are routinely referred to an ophthalmologist.

<table>
<thead>
<tr>
<th>Class</th>
<th>Visual Acuity</th>
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<tbody>
<tr>
<td>Kindergarten</td>
<td>20/50</td>
</tr>
<tr>
<td>First Grade</td>
<td>20/40</td>
</tr>
<tr>
<td>Second Grade</td>
<td>20/30</td>
</tr>
<tr>
<td>Third Grade</td>
<td>20/25</td>
</tr>
<tr>
<td>Fifth Grade</td>
<td>20/20</td>
</tr>
</tbody>
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Referrals are made for the following reasons:
1. Symptoms and a teacher's impression.
2. Failure of visual acuity.
3. Difference of two lines between the two eyes.
4. Decreasing vision on subsequent examinations.
5. Crossing of eyes.

Symptoms of visual difficulties include: inability to see at a distance, headaches, squinting of lids, tearing or seeing double.

Strabismus was next discussed. Esotropia, the tendency to turn one eye inward, is frequently accommodative, giving too much convergence. Usually it occurs on a refractive basis in patients with hyperopia. One observes it in schoolwork, or at dinner as the child's eyes attempt to follow an errant pea across his plate. Exotropia, hypertropia and cycloptropia were briefly mentioned. Variations in strabismus include: constant or intermittent types, monocular or alternating types. With the latter the child usually retains good vision in both eyes. Most youngsters with strabismus do not see double, but develop suppression and ignore what is seen by one eye. This may lead to amblyopia.

Probably all deviations are related to refractive errors or neurologic maldevelopment. Causes may be congenital, in which case, prognosis for binocular vision is poor. Accommodative effort is responsible for many cases of esotropia, especially in farsighted children. Neurologic defects, such as sixth nerve palsy, account for a small number, as do orbital diseases such as fracture or hemorrhage. The incidence is 2% in the general population.

Therapy varies with type and achievement. A child with hyperopia and strabism-
mus may correct the strabismus merely by the use of glasses to correct the hyperopia. If amblyopia is developing, patching the better eye will usually relieve the situation. Exercises alone rarely are successful unless the child still retains some ability to use both eyes together. Around 50% of all children of this type, without an accommodative error, need surgical correction.

**Question:** When should referral be made?

**Answer:** From the onset, even at 3 to 6 months of age. Glasses at age 1 year may help.

**Question:** Do you want to see those in whom it occurs only with fatigue?

**Answer:** Remember that the best results are obtained in young children who have had surgery before 2 years of age.

Dr. Miller demonstrated the reflection of light into the eyes, which centers in the middle of the pupil in normals, but away from the center in one eye when strabismus is present. Wide epicanthal folds were shown to suggest esotropia in a normal child. The cover test was demonstrated in motion pictures, as were examples of children with spasmus nutans, latent nystagmus, ocular nerve palsies and the Marcus-Gunn phenomenon.


The editor of this series, Dr. S. Z. Levine, is to be congratulated on his perceptive selection of topics which are in need of review at this time, and for his wise choice of authors to take on these assignments. Such a group of reviews as are contained in this volume are essential for anyone who strives to maintain a broad grasp of the subject matter of pediatrics. The same well-balanced assortment of material which has characterized this series of reviews is maintained in the present volume. It is fortunate that there is so little duplication in the subjects treated in the several books now available each year containing reviews of topics in pediatrics. To the respective publishers it will be a source of delight to learn that the well-read pediatrician will need all of them. The muscular disorders of childhood are discussed unusually clearly in a chapter by the eminent authority, Dr. Frank H. Tyler. The practicing pediatrician will find much-needed assistance in the chapter on psychologic principles in pediatric practice by Dr. Barbara Korsch. The timeliness of the selections is illustrated by the chapters on prevention of poliomyelitis by vaccination by Dr. Albert B. Sabin and the one on staphylococcal infections in nurseries by the group of investigators at Ohio State University. There is a very interesting chapter on the transfer of antibodies from mother to offspring by Vahlquist from Sweden. It is not feasible to undertake a review of these reviews but the reader can be assured of pleasant and profitable reading in this volume.

**Charles D. May, M.D.**
PEDIATRIC OPHTHALMOLOGY: Summary of a Round Table
James E. Miller
Pediatrics 1959;23;791

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