
Cycloscopy and fluorescein cycloscopy. K. Mizuno and M. Asaoka.

A biomicroscopic technique for observation of the ciliary process was developed, and cycloscopy and fluorescein cycloscopy have been done as a routine clinical examination. The observations reported here show that a great, previously unimagined variety of changes in the ciliary process is the usual sequel of congenital or acquired disorders. Fluorescein was seen to leak mainly from the "summit" of the ciliary process in the normal eye. Little or no leakage from the rudimentary ciliary process was seen in cases of aniridia, while vigorous leakage occurring in inflammation or vocal effusion was of particular clinical importance.

Despite efforts to perform examination of the peripheral fundus and the pars plana, only a little information has been provided about the ciliary process. Slezak had examined the posterior chamber with the help of a depression contact lens, but photography of the ciliary body had not until now been accomplished. The present experiments were designed to make available the clinical observation and photography of the ciliary process and, subsequently, to gain more information about it with cycloscopy and fluorescein cycloscopy.

Materials and methods. We employed a Hirano contact glass (Toyo Contact Lens Co., Ltd.), the 14 mm. diameters of which allow air bubbles to escape from the interspace between the cornea and the contact glass, but photography of the ciliary body had not until now been accomplished. The present experiments were designed to make available the clinical observation and photography of the ciliary process and, subsequently, to gain more information about it with cycloscopy and fluorescein cycloscopy.

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Fig. 2. Schematic drawing of normal and abnormal ciliary processes. A: Normal in the young, B: normal in the elderly, C: "decayed tooth" appearance in aniridia, D: "bizarre form" in aniridia, E: "acorn form" in Marfan's syndrome, F: vascular loops in albinism, G: "lined up rod" appearance in acute cyclitis, H: "white with frost" appearance in acute or subacute cyclitis, J: atrophy and cyclitic membrane in plastic cyclitis, K: "bared roots of the tropical tree" appearance in uveal effusion, L: "domino phenomenon" in penetrating injury, M: extreme atrophy in absolute glaucoma, N: melanomata of the ciliary process, O: Fuchs' benign epithelioma.

In cases of anterior uveitis, hypertrophy, exudation, atrophy, and deformity were, more or less, visible in accordance with the degree and duration of inflammation. In an acute or subacute type of cyclitis, the ciliary process became extremely swollen, sometimes enough to touch the lens equator, showing an appearance of lined up rods (Fig. 2, G). In granulomatosus uveitis, hypertrophy of the ciliary process was usually sporadic with or without reactive nodules. Sarcoidal nodules were a typical form of this type of change. It is also remarkable that a grayish-white exudate covered either totally or partially the ciliary process, presenting a "white with frost" appearance in either acute or subacute cyclitis (Figs. 2, H, I, and 3, B). Generally, atrophy
was limited to circumscribed areas. In the ordinary
types of exudative iridocyclitis, such atrophic
graysish patches were found in the chronic stage
either at the summit or on the mountainside.
Sometimes, in cases of the plastic type of cyclitis,
the cyclitic membrane rich in fibrin was seen be-
tween the ciliary process and the lens equator
(Fig. 2, I). In a case of uveal effusion, swelling
extended not only toward the process but also
toward plicae of the valley so that an appearance
of bared roots of a tropical tree was characteristic
(Fig. 2, K). The effect of trauma was well noted
in the marked degree of atrophy and depigmenta-
tion which was likely to occur after a penetrating
injury. Atrophy took place, essentially of the post-
inflammatory type, either diffusely or in patches,
accompanied by gross pigmentary disturbances.
The ciliary processes collapsing upon one another
were frequently observable in cases with penetra-
ting injury and intraocular tumor, indicating a pos-
sibility of traction of the ciliary process with the
connective tissue or pressure effect on it. This
type of deformity is termed the “domino phenom-
eron” (Fig. 2, L). In chronic glaucoma of any
type, either congenital or acquired, with a long-
standing rise in the ocular tension, a varying de-
gree of atrophy of the entire ciliary process was
the usual sequel. Usually the atrophic process was
widespread, but small spots of intense atrophy
occurred at the summit, accompanied by a patchy
pigmentary disturbance. In advanced cases, the
ciliary process was extremely flattened through
uniform retraction and shrinking (Fig. 2, M). A
large black hemispherical mass occupying several
ciliary processes was found in a case whose iris
root was slightly elevated. This tumor may be
simple melanomata of the ciliary body, being fol-
lowed up its course with cycloscopy. Fuchs' benign
epithelioma was occasionally found in the elderly
(Fig. 2, O).
In fluorescein cycloscopy, the summit of the
ciliary body in the normal eye was first stained
lineally or spottily with the dye 10 to 15 seconds
after injection, spreading near the summit at 30
seconds. At that time, continuous flow of the
dye from the summit forward to the lens equator
appeared (Fig. 4, A). At five minutes, fluorescein
remained in the posterior chamber, forming a
fluorescent layer around the lens equator. Subse-
quently, this fluorescein diffused into the posterior
chamber. It should be emphasized that the ciliary
processes, except in the summit and its boundary,
were not likely to leak fluorescein in the normal
eye. Contrarily, the situation altered significantly
in pathological conditions. Little or no leakage
of the dye from the rudimentary ciliary body was
evident in cases of aniridia without buphthalmos,
suggesting that a highly reduced production of
the aqueous humor may be equally balanced with
the reduced outflow of the humor. Even in slight
diffuse inflammation, in which morphological signs
were insufficient for the diagnosis of a ciliary pro-
cess involvement, fluorescein cyclogram revealed abnormal staining of the ciliary body. In general, fluorescein appeared diffusely, not only at the summit but also on the mountainside in accordance with the degree of inflammation.

Typical of this category was a case of chronic granulomatous cyclitis of sarcoidosis (Fig. 4, B). The most brilliant fluorescence appeared immediately after injection in the whole ciliary process involvement, fluorescein cyclogram revealed with the degree of inflammation. was soon fluorescent, an effect which lasted about one hour.

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From the Department of Ophthalmology, Tohoku University School of Medicine, Sendai, Japan 980. Submitted for publication Oct. 20, 1975. Reprint requests: K. Mizuno, Department of Ophthalmology, Tohoku University School of Medicine, Sendai 980, Japan.

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REFERENCES

The contralateral effect of antidromic stimulation of the trigeminal nerve on the rabbit eye. EUGENIO MAUL AND MARVIN L. SEARS.

The effect on contralateral eyes after injuries to one eye has been called the consensual reaction and has been postulated to be either the consequence of a neural reflex or one achieved by circulating substances. Trigeminal stimulation always causes ipsilateral miosis, ocular hyperemia, intraocular hypertension, and a disruption of the blood-aqueous barrier. Disruption of the blood-aqueous barrier in the contralateral eye after stimulation of the trigeminal nerve always occurs and depends on intact sensory innervation to that globe in rabbits. The disruption is not prevented by pretreatment of the animals with indomethacin. The phenomenon of disruption of the barrier is sometimes accompanied by an elevation of intraocular pressure in the contralateral eye but not by the other irritative responses. Thus, unilateral stimulation of a sensory nerve, the trigeminal, in the rabbit, can produce ipsilateral contralateral disruption of the blood-aqueous barrier.

The action of the trigeminal nerve upon ocular structures was first reported by Magendie. He observed a constriction of the ipsilateral pupil upon intracranial section of the nerve. Bernard reported the same effect in the atropinized eye and in animals with a degenerated third nerve. Maurice further studied this phenomenon and reproduced the effect on the pupil after mechanical stimulation of the trigeminal nerve in sympathetically denervated eyes. Perkins reported an increase in intraocular pressure after trigeminal stimulation, and in six of 36 experiments he observed a contralateral increase in the intraocular pressure. This contralateral effect was said to be mediated through crossed nerve fibers descending antidromically in the opposite trigeminal nerve. Humoral factors have been postulated as playing a role in consensual reactions, but among them prostaglandins probably cannot be listed because circulating prostaglandins would be inactivated by the lung and because blockade of prostaglandin synthesis does not prevent the reaction.

In this study the contralateral effect of trigeminal stimulation on the blood-aqueous barrier was singled out for study because changes in the barrier could affect intraocular pressure and in themselves be of interest in terms of regulatory mechanisms for the bloodocular barrier.

Materials and methods.

Animals. New Zealand, male, albino rabbits weighing 2 to 3 kilograms were anesthetized with Urethane (1.3 Gm. per kilogram) administered intravenously over a period of 75 to 90 minutes. The animals retained their corneal reflexes, indicating the presence of an intact sensory neural pathway.

Stimulation of the trigeminal nerve. The nerve and trigeminal ganglion were exposed through a temporoparietal craniotomy after removal by aspiration of part of the temporal lobe of the brain. The nerve could be seen as a yellow track running longitudinally underneath the dura mater in the base of the skull, 5 mm. from the sagittal plane. The trigeminal nerve was stimulated mechanically under observation through an operating microscope. The stimulation consisted of several (touches, strokes, punctures) of the nerve with a needle during a period of 60 to 80 seconds. All stimulations were done postganglionically.