

Comments on the paradoxical pupillary dilatation in optic neuropathy

THOMAS W. WALLACE, M.D.
Department of Neurology

REMOTE mild optic neuropathy may be suggested by the symptom of monocular visual dimness lasting several days or weeks, and by the finding of slight pallor of an optic disk. These are good evidence for the diagnosis of demyelinating disease. Of more importance is the discovery of active but occult retrobulbar neuritis, which is common and seemingly relieved by treatment with adrenocorticotropin (ACTH) or corticosteroids. The diagnosis of such optic neuropathy, even when active, may be difficult. In mild cases the expected pain with eyeball movement is often absent, and even careful plotting of the visual fields does not reveal the usual central or paracentral scotoma. Even the visual acuity may not be demonstrably disturbed although the patient's symptom is cloudiness of vision. It is in such instances that abnormality of pupillary light reactivity can become diagnostic.

There are several simple ways to uncover the pupil hyporeactivity, but to Gunn¹ goes the credit of popularizing the phenomenon that is often termed the Marcus Gunn pupil or the Marcus Gunn pupillary sign.² Kestenbaum³ emphasized the importance of this finding and he described modifications. Both Kestenbaum and Duke-Elder⁴ have underscored the basic pathophysiology, whereas Daroff and Smith² emphasize the clinical usefulness of the pupillary test.

Pupillary constriction to light, the pupillomotor force, is regularly impaired when optic nerve impulses are interrupted. In severe optic neuropathy the pupil is always dilated and there is little or no reaction to light. In moderately severe lesions there is no anisocoria, but diminished pupil reactivity to light is easily demonstrated. In the milder cases of unilateral optic neuropathy, covering one eye and then the other brings the factor of contrasting darkness pupillary dilatation into play to show the impaired pupillocontraction to light stimulus.

When light is aimed at the normal eye, and the eye suffering from ocular neuropathy is covered, there is normal pupillocontraction to light (*Fig. 1*). When light is aimed at the abnormal eye, and, at the same time the normal eye is covered, the pupil dilates (*Fig. 2*)—thus displaying a paradoxical light reaction due to the overwhelming of a weakened pupillomotor force by a normal consensual darkness reaction. This is the Marcus Gunn pupillary sign.

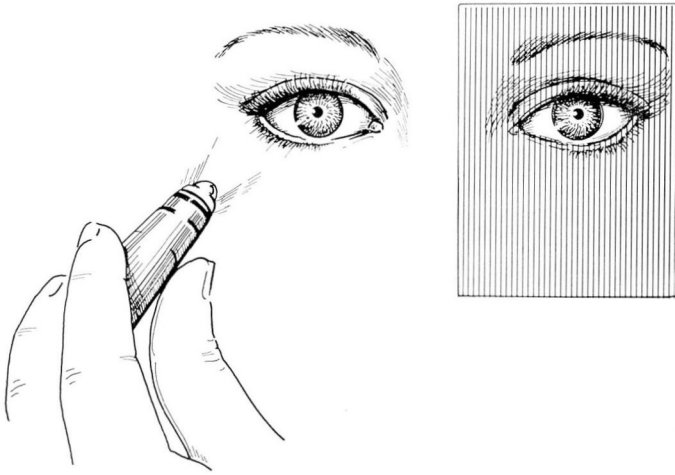


Fig. 1. Sketch showing normal light reaction in left retrobulbar neuritis with the left eye covered and the right eye illuminated. The right pupil is constricted.

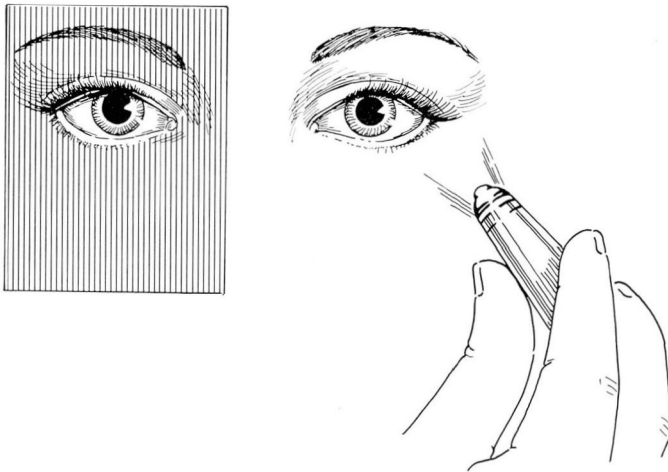


Fig. 2. Sketch showing paradoxical pupillary dilatation to light stimulation of the left eye in left retrobulbar neuritis. When the right eye is covered the left pupil dilates in a consensual darkness reflex despite the light stimulus.

One modification of the test involves rapidly and repeatedly swinging the light beam from one eye to the other in order to bring out a fast comparison of consensual light and darkness responses. In another modification the eyes are simply covered in turn without using a flashlight. This last is the basis for the pseudoanisocoria sign of Kestenbaum that lends itself to easy measurement.

Summary

In many cases of optic neuropathy, alternately covering one eye of the patient and illuminating the other will reveal that a consensual darkness reflex dilatation can overcome a weakened reflex pupilloconstriction to light. This paradoxic pupil dilatation to light is properly referred to as the Marcus Gunn pupillary sign and it may be the only abnormal finding in cases of mild retrobulbar neuritis.

References

1. Gunn, R. M.: Retro-ocular neuritis. *Lancet* 2: 412-413, 1904.
2. Daroff, R. B., and Smith, J. L.: Intraocular optic neuritis with normal visual acuity. *Neurology* 15: 409-412, 1965.
3. Kestenbaum, A.: *Clinical Methods of Neuro-Ophthalmologic Examination*. New York: Grune & Stratton, 1946, 384 p.; p. 289-291.
4. Duke-Elder, W. S.: *Text-Book of Ophthalmology*, vol. 4. St. Louis: C. V. Mosby Co., 1949; p. 3790-3791.