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A CASE OF IRREVERSIBLE STEROID-INDUCED RISE IN INTRAOCULAR PRESSURE*)

BY

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The detection that the adrenocortical steroids may cause a rise in the intraocular pressure after long-term local application has opened up new perspectives within the research into the pathogenesis of glaucoma.

This detection is important, not the least so in clinical practice, as it has given reason to increased strictness with regard to the indications for and control in using steroid-containing eye drops and ointments.

This fact has a possible chance of being utilized diagnostically, if it can afford a basis for developing a provocative test (2, 4). This is because patients with glaucoma, whether it is normotensive or hypertensive, have been found to respond to local steroid application by a definitely higher rise in pressure than a group of normals, who also responded, but by a significantly lower rise (1).

The problem is then to set up certain criteria of the value of such a provocative test, expressed by a certain minimum rise in pressure, for the diagnosis to be regarded as certain.

A relative rise, independent of the starting level, will probably be of greater value than a rise to a certain fixed level.

A detailed study of the tension-elevating effects of various steroid-containing preparations, dependent on the frequency and duration of their application, will be required to obtain a clinically useful and reliable method.

The steroids are the first drugs known to be able to provoke a rise in the intraocular pressure in man (2) similar to that noticed in true simple glaucoma. The artificially provoked rises described so far have all been reversible (2, 1), the tension having always fallen to the starting value after withdrawal of the drug.

Inspired by the information given recently by *Armaly* (1) and *Becker &*

*) Received December 1st 1964.

Mills (2) concerning these facts we started an investigation with the object of contributing, if possible, towards development of such a provocative test. At the same time we aimed at evaluating the conditions in the untreated eye, compared with the response of that with a provoked rise.

For this purpose we divided the series investigated – 93 out-patients – into three groups:

- I. Normals, i. e. patients with an intraocular pressure under 20 mm Hg, normal visual fields, and optic disks.
- II. A group of patients found by repeated measurements to have tensions ranging between 20 and 23 mm Hg incl., with no defects of vision or visual field.
- III. A group of patients with a starting tension exceeding 23 mm Hg, likewise without glaucomatous defects.

Within each of these three groups the patients were divided into one subgroup with a familial predisposition to glaucoma and one with no such predisposition.

The patients thereafter had dexamethasone*) instilled into one eye four times daily for four weeks, and the tension was controlled every two weeks. The instillation was then discontinued, and the tension was again controlled every two weeks, until it had reached the starting value in the exposed eye. The other eye served as control, and the treated eye was unselected. The original tension was re-established within four weeks of the discontinuation, except in the patient whose case history will be reported below.

The results will be reported in detail in a future paper (4). The case in question offers, however, such important and interesting peculiarities that we found it appropriate to call attention to it now.

The patient is a woman, aged 67, with no known predisposition to glaucoma. Neither has this diagnosis been suspected previously. The patient has given no history of eye troubles, apart from some complaints of "mouches volantes". An out-patient examination in April 1964 showed right vision 6/6 + 1.25 sph. and left vision 6/6 + 1.0 sph. Ophthalmoscopy revealed normal conditions. No visual field defects were found. Examination in slit lamp: no abnormality. Gonioscopy revealed wide-open chamber angles throughout.

P_{AD} and S were 25 mm Hg. After repeated examination two weeks later the patient was included in our series collected for the stated investigation and referred to the group of patients with a starting level of tension in the exposed eye exceeding 23 mm Hg. The curve illustrates the tension before, during, and after the installation. It is seen that the tension of the exposed eye remained pathologically increased, and higher than that of the control eye, through more than six months, despite intense treatment with Eppy and pilocarpine 2 %, and also after withdrawal of these drugs. At no time alterations of the visual acuity, the ophthalmoscopic findings or the visual fields were found.

*) The preparation Decadron phosphate eye drops, 0.1 %, was kindly placed at our disposal by Merck Sharp & Dohme, Nederland N. V., Haarlem.

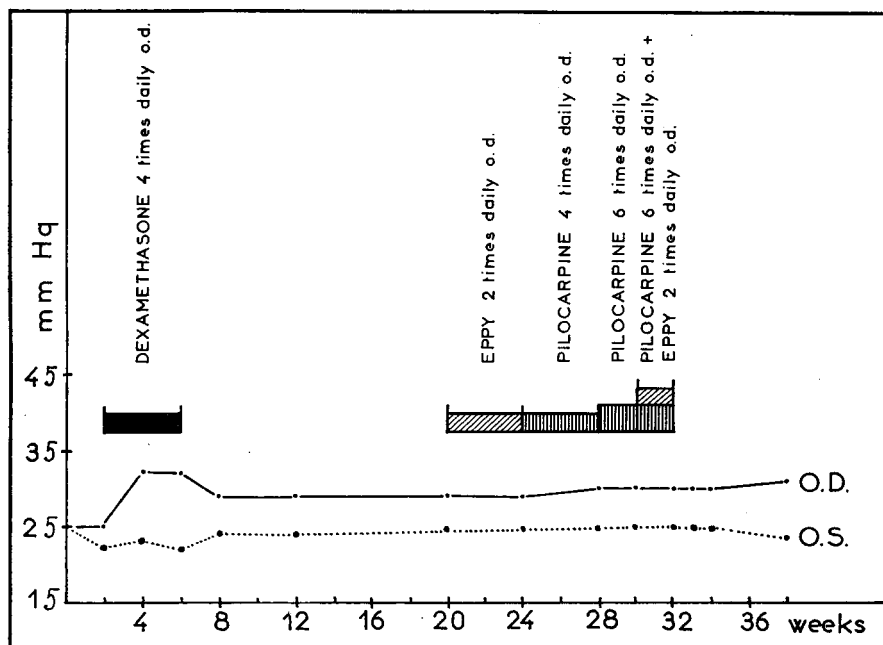


Fig. 1.

Tension of both eyes followed for 38 weeks after 4 weeks of local administration of dexamethasone to the right eye.

The case is interesting, being probably one of simple glaucoma adjusted at an early stage to a definite level of tension, determined by a certain balance between outflow facility and inflow. The provocation to which the right eye has responded is therefore likely to have altered this balance, according to *Armaly's* theory (1), so that the eye now adjusts itself to a dynamic balance at a higher level, conditional on steroid-induced changes in the metabolism of the mucopolysaccharides. Another possibility is that alterations of the hyaluronidase in the chamber angle and sclera play a part, as pointed out by *Bernstein & Schwartz* (3).

Glaucomatous defects of this eye, compared with the control eye, are now likely to be accelerated, if the pressure is not lowered.

The question accordingly suggests itself whether there is actually a difference between simple glaucoma and the steroid-induced rise in pressure, or whether the disease was provoked which it had been desired to diagnose. In future it will therefore be interesting to follow patients previously exposed to steroids with a strongly positive response.

If more such cases turn up, it will probably be advisable to enjoin cautiousness with regard to local application of steroids to humans for provocative or

experimental purposes. By such application one possibly runs a risk of activating a latent glaucoma long before it would otherwise have manifested itself.

This does not, however, preclude employment of a well-developed test, which may become exceedingly valuable, both prophylactically and with regard to early diagnosis of glaucoma.

SUMMARY

A case is reported in which a 67-year-old woman developed a moderate, irreversible rise in pressure in the exposed eye after monocular instillation of dexamethasone through four weeks for provocative purposes. Drug treatment for two months has not succeeded in returning the tension to its starting level. Neither has discontinuation of the treatment altered the level of the tension.

This calls for caution with regard to uncritical employment of more or less doubtful provocative tests on a steroid basis.

REFERENCES

1. *Armaly, M.*: Arch. Ophth.: 70: 492, 1963.
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