

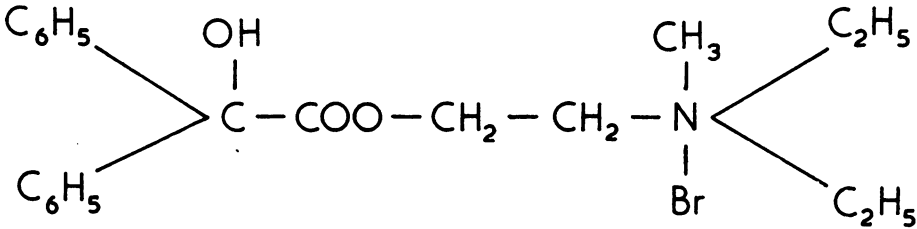
## OXYPHENONIUM BROMIDE AS A MYDRIATIC\*

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OXYPHENONIUM bromide (Antrenyl) is a synthetic quaternary ammonium salt. It is a crystalline substance easily soluble in water with a neutral reaction. Chemically it is diethyl (2 hydroxyethyl)-methyl ammonium bromide- $\alpha$ -phenylcyclohexaneglycolate with the following formula:



Oxyphenonium has an anticholinergic action like that of atropine and is used as an antispasmodic and autonomic ganglion-blocking agent in the treatment of peptic ulcer (Rowen, Bachrach, Halsted, and Schapiro, 1953) and in pre-anaesthetic medication to diminish salivary secretion (Mushin and Adams, 1955).

Havener and Falls (1954) found that one drop of 5 per cent. oxyphenonium bromide instilled into the eyes of adult albino rabbits caused excellent mydriasis within one hour which persisted for from 4 to 8 days. They also found that the mydriasis so produced was unaffected by the instillation of 0.05 per cent. diisopropyl fluorophosphate in peanut oil or 2 per cent. pilocarpine hydrochloride.

Abrahamson and Hurwitz (1954) studied the effect of a 5 per cent. solution of the drug in twenty adult patients and found that the pupil became fully dilated in from 37 to 80 minutes and that the dilatation persisted for from 10 to 21 days.

In the present study, oxyphenonium bromide was used as a 5 per cent. solution in 1:5,000 benzalconium chloride. Acutely inflamed eyes were treated every 4 hours, the frequency of dosage being reduced as the eye condition improved; post-operative cases were usually treated with twice-daily instillations. No attempt was made to eliminate multiple daily doses of the drug, as was suggested by Abrahamson and Hurwitz (1954) on the basis of the long-lasting effect of the drug.

\* Received for publication, September 27, 1956.

Of the 75 patients treated, 34 had had operations for cataract, glaucoma, retinal detachment, and penetrating injuries, and the remaining 41 were medical cases, including uveitis, kerato-iritis, vascularizing keratitis, herpes zoster ophthalmicus, deep keratitis, and molten metal burns. All the patients had already developed an allergy to atropine drops; in addition nine patients were sensitive to hyoscine, four to lachesine, one to hyoscine and lachesine, one to hyoscine and duboisine, and one to homatropine, lachesine, and duboisine.

In all cases the mydriasis was as great as with atropine, and in six cases the pupil dilated more widely with oxyphenonium than it had done with atropine.

The Table shows the length of time patients were kept on the drug. The majority of the post-operative patients were treated for less than 10 weeks, and the majority of the medical cases for more than 10 weeks.

TABLE  
DURATION OF TREATMENT WITH  
OXYPHENONIUM BROMIDE

No. of Weeks	No. of Patients
1-10	37
11-20	20
21-30	7
31-40	5
41-50	4
50+	1
1 day only	1
Total Patients	75

after 1 week, to lachesine after 2 weeks, and to homatropine after 1 week. He was then prescribed oxyphenonium bromide, and this enabled the eye to be kept under mydriasis, the right lens being extracted 4 weeks later while the eye was quiet. He continued to use oxyphenonium for a further 8 weeks when all treatment was stopped.

Two patients had already developed sensitivity to three mydriatics. The first, suffering from herpes zoster ophthalmicus with involvement of the cornea and uveal tract, developed irritation with atropine after 10 weeks, then with hyoscine after 6 weeks, and then with lachesine after 26 weeks; oxyphenonium was then used for 36 weeks without ill effect. The second, suffering from severe vascularizing keratitis of both eyes, developed allergy to atropine after 2 weeks, then to hyoscine after 1 week, and then to duboisine after 59 weeks; oxyphenonium was then used for 37 weeks with no untoward effects, the mydriasis being greater than with duboisine.

There is always a complaint of a burning sensation when the drops are instilled into the conjunctival sac, but this is momentary. Only one patient, who had severe vascularizing keratitis for which the eye was later

In all but two of the 75 patients, treatment with oxyphenonium was continued without difficulty until the necessity for a mydriatic no longer existed, in spite of the previous sensitivity of the patients to other mydriatics. The patient who had already developed sensitivity to four mydriatics suffered from iridocyclitis secondary to a leaking lens capsule. He had developed irritation to atropine after 15 weeks, to duboisine,

removed, complained of severe burning and in this case the drug was stopped after 24 hours. One patient, suffering from deep keratitis with secondary glaucoma, developed allergic dermatitis to oxyphenonium after 10 weeks treatment, having previously developed sensitivity to atropine after 5 weeks; subsequently the eye remained free from sensitivity on hyoscine for 42 weeks, after which all treatment was stopped.

It is obvious that oxyphenonium has a useful place in ophthalmology, particularly since lachesine is no longer available.

### Summary

75 patients in whom mydriasis was considered necessary, and who had already been found sensitive to local instillation of atropine and in some cases other mydriatics, were treated with oxyphenonium bromide 5 per cent. drops for periods varying from one day to 51 weeks. In one patient the drug had to be discontinued after 24 hours because of a sensation of severe burning, and another patient developed an allergic dermatitis. In the remaining 73 cases no allergic irritation occurred, and in all cases mydriasis was as good, and in six cases better, than with atropine.

Oxyphenonium bromide is a useful addition to our armamentarium.

I should like to thank Mr. O. M. Duthie and Dr. A. Stanworth for allowing me to treat their patients and for their guidance, and Ciba Laboratories, Horsham, Sussex, for sending me liberal supplies of oxyphenonium bromide.

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