Intracameral injections of framycetin sulphate (Soframycin) in fulminating corneal infections

A clinical trial

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The impermeability of the blood-aqueous barrier to certain antibiotics precludes their use in intraocular infections, and it is very difficult to identify the causative organism if laboratory facilities are not available.

With these limitations in view we embarked upon a blanket trial of framycetin sulphate (Soframycin eye drops 0.5 per cent.) by intracameral injection in nine cases of intractable hypopyon ulcer.

Soframycin is an antibiotic effective against many Gram-positive cocci, especially staphylococci and Gram-negative bacilli. Lutz and Hofferer (1955) found that many strains of *B. proteus* and *Ps. aeruginosa* were sensitive to it *in vitro*. Ainslie and Henderson (1958) found it to be effective by the subconjunctival route, and being highly soluble in water it does not cause any undue tissue irritation. Subconjunctival administration in corneal infection, both clinical and experimental, due to *Staph. aureus*, *Staph. albus*, *Pneumococcus*, *E. coli*, and *Ps. aeruginosa* gave satisfactory results (Ainslie and Cairns, 1960).

Material and methods

Patients Those with hypopyon corneal ulceration, for whom there was apparently no chance of retaining eye or vision, were selected for this study, and it was explained to them that the sight could not be restored in any case although it might be possible to save the eye.

Anaesthesia 1 per cent. Anaethain drops were instilled three times every 5 minutes so as to cause surface anaesthesia, and the cornea was incised with a sharp cataract knife at 2 or 10 o'clock inside the limbus. This upper portion was selected to ensure that the drug remained as long as possible in the anterior chamber, by avoiding leakage due to gravity.

Surgery Almost all the aqueous was drained out by depressing the posterior lip with an iris repositor. 0.3 ml. Soframycin was injected into the anterior chamber with a 2 ml. syringe and fine needle.

Postoperative care Atropine drops (1 per cent.) and Soframycin ointment were applied and the eye was bandaged.

No systemic antibiotics were given, but analgesics were given whenever needed. Cleansing, hot fomentations, and atropine and Soframycin eye drops were applied locally. In cases in which a

poor nutritional status with probable malabsorption from the intestines was suspected, a course of Vitamin A 300,000 units intramuscularly once a week, Vitamin B complex 2 ml. on alternate days, and Vitamin C 500 mg. daily was instituted before the Soframycin study.

Observations

Case 1, a 74-year-old man, was admitted to hospital in December, 1966, with recurrent hypopyon ulcer of the right eye. Soframycin was injected into the anterior chamber on the 1st, 4th, and 7th days, and the eye then began to become quiet. The patient was discharged in good condition and there has been no recurrence.

Case 2, a 45-year-old man, was admitted in December, 1966, with hypopyon ulcer and spastic entropion of the right eye. The eye responded dramatically to intracameral injection of Soframycin and the spastic entropion was corrected by the application of sutures and adhesive plaster. He was discharged in good condition and has not returned.

Case 3, a 55-year-old man, was admitted in December, 1966, with a sloughing corneal ulcer of the left eye with impending perforation. Intracameral injections of Soframycin were given repeatedly, but the eye did not respond and the ulcer finally perforated. This resulted in shrinkage of the eye, which subsequently became painful and was removed. In this case the anterior chamber puncture probably accelerated the perforation as the corneal stroma was already almost melting away.

Case 4, a 30-year-old man, was admitted in April, 1967, with hypopyon ulcer. Intracameral injection was repeated biweekly; the eye began to respond after the fourth injection and recovered fully in 3 weeks.

Case 5, a 14-year-old boy, developed an ulcer after injury with a sugar cane in May, 1967. There was frank hypopyon with all the active signs of iritis. Intracameral injections of Soframycin were given every third day, and the eye became quiet in 5 weeks. It subsequently became soft and shrunken through atrophy of the ciliary body, but was no longer painful.

Case 6, a 45-year-old diabetic man, had an operation for cataract in the right eye in July-August, 1967, and the section started to gape 3 weeks after the operation, the anterior chamber becoming full of pus. Paracentesis was performed with intracameral injection of Soframycin, and this was repeated every day. There was no focus of infection in the body. The eye did not respond to therapy, not even with a systemic course of broadspectrum antibiotics and antidiabetic treatment. The diabetes was not effectively controlled and the eye, though quiet and painless, tended to shrink.

Case 7, a 65-year-old man, was admitted in September, 1967, with a sloughing corneal ulcer of the left eye and impending perforation. Injections of Soframycin were given every day into the anterior chamber, and the ulcer became inactive after seven injections. The patient was discharged after about 3 weeks.

Case 8, a 45-year-old man, was admitted with a history of injury to the right eye by a sugar cane leaf. There was an hypopyon ulcer with impending perforation. The eye began to respond after two injections. The patient is still receiving treatment.

Case 9, a 50-year-old woman, was admitted in October, 1967, with a history of formation of pus in the left eye. She had been blind in that eye for one year, having had an intraocular operation 5 years previously. The anterior chamber was full of pus and no observations of pupil, vision, or lens were possible. She was given intracameral injections on alternate days and the whole chamber cleared after the fourth injection. She is still receiving treatment.

Results

The response of eight out of nine eyes to Soframycin therapy was encouraging. The activity of the ulcer was controlled in about 5 to 7 days, so that the patients had no photophobia, watering, or perforation, and the congestion decreased. In the patient whose eye was lost (Case 3), the organisms were highly virulent and the general health was poor. The secondary rise in intraocular pressure (after puncture) possibly made the perforation easy after which the eye started shrinking.

Discussion

Intracameral injection is a procedure reserved for desperate cases, as to irrigate the ocular tissues with penicillin solution in acute infective conditions or with cortisone in sympathetic ophthalmitis. Havener (1966) and Ellis and Smith (1963) reported the intracameral use of various other antibiotics, such as bacitracin, chloramphenicol, neomycin, penicillin G, polymyxin B, streptomycin, and tetracycline. Agarwal, Meneze, Khosla, and Mohapatra (1965) have used the intracameral route experimentally in animal eyes. The present study was undertaken to test the tolerance of Soframycin by human ocular tissue and to evaluate the use of topical antibiotics. Soframycin, which is closely related to streptomycin and neomycin, was chosen because of its effectiveness against Gram-positive cocci and Gram-negative bacilli, including *Ps. pyocyaneus*. All three are amino sugars and have similar properties. Soframycin is soluble in water and insoluble in oil. In aqueous solutions it is most stable at a pH of 6.3. A further advantage is that these drops are remarkably non-irritant.

Summary

This study of intraocular Soframycin revealed certain interesting facts. Although the ulcers were so severe that the sight could not be saved, the postoperative results were unexpectedly encouraging. The preparation, originally intended for topical use, was used successfully intracamerally. It was well tolerated and was effective in controlling and clearing the infection. There were no side-effects. We have found this a safe and simple procedure which may avoid the need for enucleation. The technique does not require much instrumentation and may even be carried out in the ward.

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