

SUBCONJUNCTIVAL ADMINISTRATION OF SOFRAMYCIN IN THE TREATMENT OF CORNEAL INFECTIONS*

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THE properties of Soframycin, an antibiotic extracted from the mould *Streptomyces decaris*, were first evaluated by Massenat-Derouche (1954). Its properties in relation to the eye and its effect upon experimentally produced corneal infections were described by Ainslie and Henderson (1958). It was found to be especially effective against staphylococcal infections but was active too against many Gram-negative bacilli.

While Soframycin may be used topically as an ointment or drops in the treatment of superficial ocular infections, it has no particular advantage in this respect over other broad-spectrum antibiotics. It appeared to be almost completely non-irritant when injected subconjunctivally in the rabbit in doses of up to 500 mg., and it was this lack of irritation following experimental subconjunctival injection that made it seem ideal for administration by this route in clinical practice.

In the following series, thirty cases of corneal infection treated by subconjunctival injection of Soframycin are described. The Soframycin was dissolved in either distilled water or 1/5000 adrenaline (400 mg./ml.). 100 to 500 mg. were given in a single dose and in some cases this was repeated daily for 3 days. Definite clinical evidence of corneal infection was present in every case, though bacteriological culture was positive in only the minority. Bacteriological cultures gave the following results:

<i>Staph. aureus</i> , 3	<i>B. coli</i> , 1
<i>Staph. albus</i> , 1	<i>Pneumococcus</i> , 2
<i>Ps. pyocyanea</i> , 1	<i>B. xerosis</i> , 3
No growth, 19.	

The high proportion of cases in which no growth was obtained is probably explained by the fact that topical antibiotics or chemotherapeutic agents had previously been applied in almost every case. It seems likely that the surface organisms had been destroyed although the deeper infection remained unaffected.

In sixteen of the cases in this series the infection followed injury to the cornea by a foreign body; in twelve there was no history of trauma; in one infection followed a simple corneal abrasion; in the last case infection followed a penetrating corneal wound (Table, overleaf).

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TABLE
RESULTS IN THIRTY CASES OF CORNEAL INFECTION
TREATED WITH SOFRAMYCIN

Case No.	Nature of Case	Bacteriology	Dosage of Soframycin (All Subconjunctival)	Result of Treatment
1	Corneal Ulcer (spontaneous) 1 mm. hypopyon	<i>B. coli.</i>	250 mg. Single dose	Rapid initial improvement Healed in 3 days
2	Corneal Ulcer (spontaneous) 2 mm. hypopyon	No growth	250 mg. Single dose	Rapid improvement Healed in 4 days
3	Infected Corneal Wound (following foreign body) 2 mm. hypopyon	<i>Staph. aureus</i> Coagulase positive	250 mg. on three successive days (750 mg. total)	Healed in 4 days
4	Corneal Ulcer (spontaneous) 2 mm. hypopyon	No growth	100 mg. on two successive days (200 mg. total)	Gradual improvement Healed in 5 days
5	Corneal Ulcer (spontaneous) In senile patient 2 mm. hypopyon	<i>Staph. albus</i> Coagulase negative	250 mg. on two successive days (500 mg. total)	No immediate improvement Gradually settled
6	Corneal Ulcer (spontaneous) 1 mm. hypopyon	Pneumococcus	250 mg. on two successive days (500 mg. total)	Healed in 3 days
7	Infected Corneal Wound (following foreign body)	<i>Staph. aureus</i> Coagulase positive	250 mg. on three successive days (750 mg. total)	Marked improvement after second dose Healed in 4 days
8	Corneal Ulcer (spontaneous) Large area	No growth	200 mg. on two successive days (400 mg. total)	Rapid initial improvement, then slow resolution over 2 weeks
9	Corneal Ulcer (spontaneous) 3 mm. hypopyon	No growth	500 mg. Single dose	Marked improvement after 24 hrs Healed in 3 days
10	Corneal Wound (penetrating) Corneal abscess and hypopyon	No growth	500 mg. Single dose	Infection unchecked Ring abscess of cornea developed
11	Infected Corneal Wound (following foreign body)	No growth	500 mg. Single dose	Healed in 24 hrs
12	Infected Corneal Wound (following foreign body)	<i>B. xerosis</i>	500 mg. (first dose) 300 mg. (second dose) } 800 mg.	Healed in 3 days
13	Infected Corneal Wound (following foreign body) 2 mm. hypopyon	Pneumococcus	500 mg. Single dose	Marked improvement after 12 hrs Healed in 3 days

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Case No.	Nature of Case	Bacteriology	Dosage of Soframycin (All Subconjunctival)	Result of Treatment
14	Infected Corneal Wound (following foreign body)	<i>Ps. pyocyanea</i>	500 mg. on two successive days (1 g. total)	Infection checked Slow healing subsequently
15	Infected Corneal Wound (following foreign body)	No growth	500 mg. Single dose	Healed in 24 hrs
16	Corneal Abscess (unknown aetiology) In senile patient	<i>B. xerosis</i>	500 mg. Single dose	Rapid initial improvement Slow healing
17	Infected Corneal Wound (following foreign body)	No growth	500 mg. Single dose	Healed in 48 hrs
18	Infected Corneal Wound (following foreign body)	No growth	500 mg. Single dose	Healed in 24 hrs
19	Infected Corneal Wound (following foreign body)	<i>B. xerosis</i>	500 mg. Single dose	Healed in 24 hrs
20	Infected Corneal Wound (following foreign body)	No growth	500 mg. Single dose	Healed in 24 hrs
21	Infected Corneal Wound (following foreign body)	No growth	500 mg. Single dose	Healed in 24 hrs
22	Corneal Ulcer (unknown aetiology) Recurrent	No growth	500 mg. Single dose	Rapid improvement proceeding to healing in 3 days
23	Infected Corneal Wound (following foreign body)	No growth	500 mg. Single dose	Healed in 2 days
24	Corneal Abscess (following foreign body)	No growth	500 mg. Single dose	Rapid initial improvement Gradually healing over 10 days
25	Infected Corneal Wound (probably abrasion) 1 mm. hypopyon	No growth	300 mg. Single dose	Rapid improvement
26	Corneal Ulcer Recurrent	No growth	500 mg. Single dose	Infection checked Gradually healing subsequently
27	Infected Corneal Wound (following foreign body)	No growth	500 mg. Single dose	Healed after 24 hrs
28	Corneal Abscess (unknown aetiology)	No growth	500 mg. Single dose	Rapid resolution
29	Corneal Ulcer (case of spring catarrh) Hypopyon	No growth	500 mg. Single dose	Rapid improvement after injection Slow resolution
30	Infected Corneal Wound (following foreign body)	<i>Staph. aureus</i> Coagulase positive	500 mg. Single dose	Infection progressed unchecked

Results

The results of the treatment of corneal infections by the subconjunctival administration of Soframycin were mostly satisfactory. Of the thirty cases treated, 21 improved rapidly and seven others more slowly. Two patients did not appear to benefit.

In the majority of cases the clinical appearance of dense, localized corneal infiltration suggested that staphylococci or pneumococci were the causative organisms. Two cases of severe hypopyon corneal ulceration from which pneumococci were isolated healed rapidly after Soframycin treatment. Another case of severe hypopyon ulcer (Case 12), which had failed to improve despite the subconjunctival administration of 500,000 units penicillin and 0.5 g. streptomycin healed rapidly after Soframycin therapy. It should be noted, however, that in one instance (Case 30), where Soframycin had failed to arrest the infection, the subconjunctival injection of Crystamycin (penicillin and streptomycin) was effective. In four cases the clinical appearance was that of diffuse spreading necrosis characteristic of infections due to the Gram-negative bacilli. Three of these, including one (Case 14) where there was cultural confirmation of the presence of *Ps. pyocyanea*, responded satisfactorily to Soframycin. In the remaining case in this group (Case 10), where infection followed a perforating corneal wound, Soframycin was ineffective, but the infection was controlled by the subconjunctival administration of streptomycin and Polymyxin.

In no case was there any untoward reaction following the subconjunctival injection of Soframycin and little pain was caused by the injections. It was not found necessary to add a local anaesthetic to the solvent; the topical application of 4 per cent. cocaine drops to the conjunctival sac provided satisfactory anaesthesia.

Summary

(1) Thirty cases of corneal infection treated by the subconjunctival injection of Soframycin are described. Satisfactory results were obtained in the majority.

(2) Soframycin is easily soluble, and 500 mg. dissolved in 1 ml. water may be injected subconjunctivally with safety.

(3) Soframycin is almost completely non-irritant and little pain follows subconjunctival injection.

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