

AN EPIDEMIC OF CONJUNCTIVITIS IN SINGAPORE IN 1970

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SYNOPSIS

This paper reports an outbreak of acute conjunctivitis of rapid onset which assumed epidemic proportions never encountered in Singapore previously. Of 60,118 cases reported 114 were examined and 55 studied for virus infection. The clinical features of the disease did not resemble epidemic keratoconjunctivitis (E.K.C.) that has been previously reported in Singapore. Evidence from laboratory investigation of viral isolates recovered from conjunctival swabs and from a throat gargle suggested that the viral isolates are not adenoviruses.

INTRODUCTION

Adenovirus infections of the eye have been reported in Singapore previously. A minor outbreak of 125 cases of keratoconjunctivitis occurring in March through April, 1960, in which adenovirus Types 3 and 7 were isolated from eye-swab specimens was reported by K. Singh and Yin-Coggrave¹ and Yin-Coggrave². In a further investigation, Yin-Coggrave and Loh³ isolated adenovirus Types 3, 4, 7 and 8 from conjunctival scrapings of cases that occurred throughout the year from June, 1962 through August, 1963.

This paper reports an outbreak of acute conjunctivitis of rapid onset which assumed epidemic proportions never encountered in Singapore previously. At its peak during September and October, 1970, 60,118 cases were reported from the Government Out-patient Services, according to returns from 27 Government Out-patient Dispensaries. Of 325 cases referred to the Ophthalmic Unit of Outram Road General Hospital, 114 were examined by author K. H. Lim.

Fifty-five consecutive patients seen at the height of the epidemic from September 18th to 24th were studied. Negative findings of bacterial cultures of conjunctival swabs from unselected cases in early September, supported by the presence of predominantly mononuclear cells suggested that the disease was due to viral infection. Hence, in the 55 patients in addition to bacterial cultures to determine the pattern of secondary infection virus studies were also undertaken.

CLINICAL FEATURES

The clinical features of the disease are analysed in Table I. Many patients were able to time the onset of sudden swelling, redness, congestion or

TABLE I
ANALYSIS OF 55 CASES OF EPIDEMIC
CONJUNCTIVITIS IN SINGAPORE, 1970

Clinical Features	No. of Cases	Per 100
Sex		
Male	35	64
Female	20	36
Age		
10 years	2	3
10-20 years	12	22
20-30 years	18	30
30-40 years	15	27
40-50 years	7	18
Contact		
Home	30	55
Office	10	18
Factory	1	1.8
Hospital	3	5
School	6	11
Nil	5	9
Upper respiratory symptoms	13	23
Laterality		
Both	39	70
Right	8	15
Left	8	15
Lid swelling	25	45
	(2 ptosis)	
Mucopurulent discharge	22	40
Conjunctivitis		
Mild	13	23
Severe	36	65
Subconjunctival haemorrhages	6	11
Keratitis	2	3
Iritis	3	5
Lymphadenitis of Pre-Auricular Glands	28	51

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pain in the eye to an hour and the majority (90%) were examined within 1 to 3 days of onset. More males (64%) than females were seen and most patients (97%) were adults. Thirty patients (55%) reported contact with a case at home, ten (18%) at work in an office, one (1.8%) in a factory, three (5%) in hospital, six (11%) at school, while five (9%) reported no obvious contact. None had been in a swimming pool recently. Of the 30 patients who reported contact with a case at home, 13 reported that 3 to 11 other members in their family were having the disease at about the same time. Thirteen patients (23%) had associated upper respiratory symptoms and in the one of these who had a prolonged sore-throat, virus isolation was attempted from a throat-gargle during the third week of disease.

In 39 patients (70%) both eyes were affected. Nearly half presented with lid-swelling (45%), mucopurulent discharge (40%) and adenitis of the pre-auricular glands (51%) when examined within 1 to 2 days of onset. Two had inflammatory ptosis with possible tarsitis. Six (11%) showed subconjunctival haemorrhages occurring on the third day, lasting one to two weeks. Keratitis was seen in 2 (3%) and iritis in 3 (5%), during the second week of disease. However, a later series of patients examined during the end of the epidemic, showed a higher incidence of corneal and iritic involvement.

BACTERIAL STUDIES

Each conjunctival swab was inoculated into one Filde's agar and two blood agar plates. The Filde's medium and one blood agar plate were incubated aerobically at 37°C while the second blood agar plate was incubated anaerobically. Twenty-three (42%) conjunctival swabs were sterile. Four (7.3%) gave pure cultures of Staphylococci, 8 (15%) of Corynebacteria and 20 (36%) combinations of Corynebacteria, Staphylococci, alpha-haemolytic Streptococci and *Neisseria catarrhalis*. Kock-Week's bacillus was not found.

The Staphylococci produced haemolysis on blood agar plates but were coagulase and phosphatase negative. Of 13 strains of Corynebacteria tested, 8 were *C. xerosis*, 2 *C. hofmanni* and 3 *C. intermedius*. The Elek's plate test showed the strains of *C. intermedius* to be non-toxicogenic.

Antibiotic sensitivity tests on the Staphylococci and Corynebacteria showed that both organisms were sensitive to sulphacetamide but resistant to the common antibiotics: penicillin, streptomycin, framycetin and neomycin that could be used as eye-drops.

VIRAL AND SEROLOGICAL STUDIES

Conjunctival scrapings suspended in Hanks' balanced salt solutions containing 200 units penicillin and 200 ugm. streptomycin per ml. were inoculated into tubes of HeLa cell and primary monkey kidney (MK) cultures. Thirty cytopathogenic agents were isolated from 55 conjunctival scrapings and 1 from a single throat gargling inoculated in HeLa cell cultures. However, inoculated MK cultures held over a period of 14 days, yielded negative results.

Unlike a typical adenovirus, the isolates produced groups of rounded cells which do not detach easily from the wall of the test tubes. The high acidity in culture medium characteristic of an adenovirus infection was also absent. When tested by the complement fixation test with diagnostic adenovirus immune sera obtained from *Borroughs and Wellcome* the isolates gave low or inconclusive results. None of the isolates were neutralised by adenovirus Types 1 to 18 immune sera obtained from the Department of Health, Education, and Welfare, C.D.C., Atlanta, Georgia. Several strains grown in human foetal kidney cultures and baby hamster kidney cultures failed to haemagglutinate rat or rhesus red blood cells in spite of their high infectivity titres. Strains of viruses established in HeLa cell cultures do not produce cytopathogenic effect (CPE) in MK cultures although the same inoculum produce CPE in HeLa cell cultures within 48 hours of inoculation. Two batches of one day old suckling mice inoculated with 0.01 ml. virus suspension intracerebrally and 0.01 ml. subcutaneously remained healthy over a period of 21 days.

Eighteen single and 35 paired (acute and convalescent) sera were tested for adenovirus complement fixing (CF) antibodies. Twelve of 18 single sera had CF titres ranging from 1/2 to 1/32 whilst the remaining 6 were negative. Thirty-four of the 35 paired sera had CF titres of 1/2 to 1/32 in the acute phase while one was negative. Eighteen of the 34 positive sera showed a two fold rise in CF antibody titres between their first and second sera.

TREATMENT

Thirteen patients of the 22 who had mucopurulent discharge were given 4-hourly eye drops of 20% sulphacetamide while the remaining 42 patients of whom 9 had mucopurulent discharge and 33 without mucopurulent discharge were given 4-hourly eye drops of 1½% hydrocortisone with ½% neomycin. There appeared to be a better response to hydrocortisone with neomycin as 19 patients (45%) recovered within 1 to 5 days of treatment against 2 patients (15%) treated with

sulphacetamide. Allergy to sulphacetamide occurred in one patient. All the patients made a complete recovery.

DISCUSSION

An epidemic of acute conjunctivitis of rapid onset that involved at least 60,118 persons in Singapore during September to October 1970 is reported. The sudden onset of infection, the high infectiousness of the disease and the epidemic proportions of the outbreak were unusual features.

Fifty-five patients studied at the height of the epidemic showed that in the majority of them both eyes were affected and that nearly half of them presented with lid-swelling, mucopurulent discharge and pre-auricular gland enlargement. Subconjunctival haemorrhages were also seen. The clinical features did not resemble those observed by Singh¹ and Loh³ during the E.K.C. outbreaks in Singapore in 1960 and 1962 as in our patients the onset was sudden, the conjunctivitis acute and recovery rapid, and moreover, haemorrhagic features were also observed. Keratitis or iritis frequently encountered in E.K.C. was rarely seen in our patients.

Thirty-two patients had secondary infection with Staphylococci, Corynebacteria, Streptococci and Neisseria. The Staphylococci and Corynebacteria were sensitive to sulphacetamide but resistant to neomycin when tested on culture plates. Patients treated with eye drops of hydrocortisone with neomycin showed a better response than with eye drops of sulphacetamide. Treatment was empirical for it was not established whether neomycin suppressed the bacterial infection or whether hydrocortisone used in conjunction relieved the inflammation that might have been caused by the virus.

Thirty viruses were isolated from 55 conjunctival scrapings and 1 virus from a throat gargling. These isolates could not be identified as adenoviruses when tested with group specific CF adenovirus immune sera. They were not neutralized by adenovirus Types 1 to 18 immune sera which include types known to cause epidemic conjunctivitis. The majority of these patients had low CF antibody titres to adenovirus. It is not possible to say at this stage if the presence of these CF antibodies is related to the eye condition. The four-fold or greater CF antibody rise commonly found in the convalescent sera of E.K.C. cases was not detected.

The National Institute of Allergy and Infectious Disease, Hawaii reported that our viruses do not behave like typical adenoviruses by CF and haemagglutination-inhibition tests. Further characterization of the isolates is being undertaken.

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