

EPIDEMIC CONJUNCTIVITIS: DISCOVERY OF A NEW AETIOLOGIC AGENT*

By K. H. Lim

SYNOPSIS

Hitherto unknown picornaviruses recovered from patients during outbreaks of epidemic conjunctivitis in Singapore in 1970 and 1971 have been shown to be the cause of the infection. From September to December, 1970 a sudden outbreak of acute conjunctivitis of rapid onset assumed epidemic proportions never encountered in the country previously. The eye disease was characterized by mild to severe conjunctivitis, lid swelling, subconjunctival haemorrhage and pre-auricular gland adenitis. Haemorrhagic features and absence of keratitis clinically distinguished the disease from epidemic keratoconjunctivitis. A clinically similar epidemic occurred during June to December, 1971. Compared with reports from elsewhere, haemorrhagic features were not a constant characteristic of the infection in Singapore.

Laboratory investigation demonstrated that different antigenic types of picornaviruses were responsible for the 1970 and 1971 outbreaks and that the 1971 outbreak was caused by a virus similar to the acute haemorrhagic conjunctivitis virus isolated in Japan in 1971. Serological findings confirmed the aetiological significance of the isolates.

INTRODUCTION

Outbreaks of unprecedented viral infection of the eye that swept through many countries in pandemic form and the first successful isolation of a new aetiological agent from patients in Singapore is described.

Soon after Apollo 11 returned to earth from its historic moon landing of July 21, 1969 an acute infection of the eye broke out in epidemic form in Ghana. Chatterjee *et al* (1970a) gave the first written account of this new disease, thus:

"It is for the first time in the history of Ghana that people have seen an epidemic of acute conjunctivitis affecting hundreds of people at a time and spreading quickly far and wide".

Like the opening sentence in Fleming's *Casino Royale*, this description launched forth a medical adventure that was soon to baffle many workers including the original writers who, in a later report (Chatterjee *et al*, 1970b), mistook the disease to be caused by a variant of adenovirus.

"APOLLO 11 DISEASE"

The lay public of Accra had nicknamed the disease "Apollo 11" and were aided by the local Ghanaian Times reporting, "Apollo 11 illness spreads to Tema and Nsawam". Actually, Chatterjee *et al* (1970a) were quick to dismiss the moon-myth, pointing out that the disease was first observed in Nungua about the middle of June in 1969, one month before Apollo 11 was launched. However, the epidemic spread to Lagos in October, 1969 (Akinsete, 1970) and Parrott (1971) reporting on moon-gazers in Nigeria further described "An Epidemic called Apollo".

(If Apollo, the renowned physician of classical mythology who instructed his son Aesculpius in medicine, who later helped Neptune build the walls of Troy and when refused the promised reward by the king Laomedon sent a pestilence upon the inhabitants, brought back germs from the moon, this surely must be evidence of life in outerspace; Apollo, in modern history, repeating thus its pestilence on earth with a germ for war-fare and, as the germs were subsequently first isolated in Singapore the American Space Program would surely have descended on us.)

PANDEMIC SPREAD

The disease spread along the west coast of Africa through 1969 and by 1970 outbreaks were reported in the Ivory Coast, Cameroon, Togo, Liberia, Sierra Leone, Senegal and Gambia (Diallo, 1971; Maitchouk, 1972). There was also an

*Presented at the 46th General Scientific Meeting, Royal Australasian College of Surgeons, in Singapore on May 10, 1973.

Ophthalmic Unit, Outram Road General Hospital, Singapore.

K. H. LIM, M.B., D.O., F.R.C.S.I., A.M., Ag. Senior Ophthalmic Surgeon and Head.

unconfirmed rumour that the disease already existed in Vietnam (Tung, 1972), Bali and Djakarta (Salim, 1972) in 1969 (Leading Article Lancet, 1973), a Lancet leading article suggesting that:

“at the beginning, there were two epidemic foci—Ghana and Indonesia... the Moslem pilgrimage, an epidemiological common denominator of the two countries, may have played a part in the initial spread”.

By 1971, the epidemic had erupted over all Asia, the Far East and Europe (Fig. 1) and was still prevalent in many countries in 1972 (Leading Article Lancet, 1973). Thus far, no report of an outbreak has come from the United States (Troutman, 1972), South America, New Zealand or Australia (Leading Article Lancet, 1973) and, remembering our epidemics, I hope that you will be spared this experience.

Year	Month	Country	Source
1969	June	Nungua in Ghana	Chatterjee <i>et al</i> , 1970
	May/November	Java	Salim, 1972, (unconfirmed)
	September/November	Lagos in Nigeria	Akinsete, 1970
	October/February '70	Nigeria	Parrott, 1971
	September/December	Senegal, Ivory Coast, Cameroon	Diallo <i>et al</i> , 1971
1970	January/February	Togo, Liberia, Sierra Leone	Maitchouk, 1972
	April/September	Djakarta, Bali in Indonesia	Salim, 1972
	September/December	Singapore	Lim & Yin-Murphy, 1971
	October	Gambia	Maitchouk, 1972
1971	January/February	Morocco, Algeria	Maitchouk, 1972
	April	Bombay in India	Pramanik, 1972
	May/September	Java, Sumatra in Indonesia	Salim, 1972
	June/July	Bombay in India	Singha, 1972
	June/July	Lucknow in India	Saxena <i>et al</i> , 1972
	June/August	Moscow	Maitchouk, 1972
	June/December	Singapore	Lim & Yin-Murphy, 1972
	June/December	South Korea	Kim, 1972
	August	Hong Kong	Lee, 1972
	September/October	Manila, Luzon, Amlan in Philippines	Salceda, 1971
	September/October	London	Jones, 1972
	October/December	Japan	Mitsui <i>et al</i> , 1972
	December	Tunisia	Maitchouk, 1972
1972	February	Yemen	Maitchouk, 1972
	August/January '73	Singapore	Lim, 1973

Fig. 1. PANDEMIC SPREAD OF EPIDEMIC CONJUNCTIVITIS

SINGAPORE EXPERIENCE

The epidemic hit Singapore in mid-1970: at its peak, during September to October, more than 60,000 patients reported to Government clinics for treatment of sore eyes. In a preliminary report to the Sixth Singapore-Malaysia Congress of Medicine on August 6, 1971, Lim and Yin-Murphy (1971a) observed that the clinical features of the disease, viz. presence of haemorrhages and absence of keratitis, distinguished it from adenoviral epidemic keratoconjunctivitis. This was confirmed by a negative or low complement fixing antibody to adenovirus in patients' acute and convalescent sera. Koch-Weeks infection was excluded by negative bacterial culture of conjunctival swabs although a variety of non-pathogenic bacteria were found (Lim and Yin-Murphy, 1971a).

CLINICAL FEATURES

The clinical features of the disease seen in Singapore during the 1970 epidemic compared with a further epidemic in the country in 1971 were closely similar (Lim and Yin-Murphy, 1972). Typically, patients experienced a sudden onset, usually within hours, of a sensation of foreign bodies or acute pain in the eye, with lacrimation and photophobia. Patients who presented within 1 to 2 days of onset of the disease showed lid swelling, eye discharge, conjunctivitis, subconjunctival haemorrhage and pre-auricular gland adenitis. Keratitis and iritis were rarely seen. A mild fever, malaise, and upper respiratory symptoms were noticed in some patients. Haemorrhagic features, however, were not a constant characteristic of the infection in Singapore, although other authors (Mitsui *et al*, 1972) reported that subconjunctival haemorrhages were pathognomonic.

VIROLOGY

Lim and Yin-Murphy (1971b) observed that: "the sudden onset of infection, the high infectiousness of the disease and the epidemic proportions of the outbreak were unusual features"

which suggested a fast viral infection, at a time when a virus had not been shown to be the cause of the disease. The same workers reported the first successful isolation of viruses from conjunctival scrapings and throat gargling of patients seen at the acute stage of illness during the epidemic in Singapore in September of 1970. Yin-Murphy (1972a) subsequently identified the isolates as ether and acid resistant picornaviruses of

less than 25 n.m. size. With heightened interest, this discovery was first announced at the Fourth Congress of the Asia-Pacific Academy of Ophthalmology in Auckland on April 13, 1972 (Lim and Yin-Murphy, 1972). The virus was referred to as Singapore Epidemic Conjunctivitis (S.E.C./1970) virus but its taxonomical position is still unestablished (Yin-Murphy, 1972a).

A further outbreak of the epidemic was seen in the country the following year when more than 30,000 patients reported to Government clinics during June to December, 1971 for treatment of sore eyes (Lim and Yin-Murphy, 1972). From August to October, 1971 the epidemic was reported in Japan (Mitsui *et al*, 1972) where Japanese workers (Kono *et al*, 1972) reported isolation of an antigenically different picornavirus, called the acute haemorrhagic conjunctivitis (A.H.C./1971) virus. Comparative study of the picornavirus isolated from the 1971 Singapore and Japanese outbreaks and paired sera obtained from patients during the 1971 outbreak in Singapore showed that the second epidemic in Singapore was caused by a virus identical or closely related to Japanese A.H.C./1971 virus and not by a reappearance of the S.E.C./1970 virus (Yin-Murphy and Lim, 1972; Yin-Murphy, 1973).

In conclusion, hitherto unknown picornaviruses recovered from patients during outbreaks of acute conjunctivitis in Singapore in 1970 and 1971 is described. The taxonomical position of the viral isolates is still unestablished. An antigenically different virus representing a variant or subtype of the Singapore Epidemic Conjunctivitis virus (1970), isolated in Japan in 1971, was shown to be the cause of a further epidemic in Singapore in 1971.

REFERENCES

1. Akinsete, E.O.: "Outbreak of Epidemic Conjunctivitis in Lagos." *Journal of the Nigerian Medical Association*, 7, 46-50, 1970.
2. Chatterjee, S., Quarcoopome, C.O. and Apenteng, A.: "An Epidemic of Acute Conjunctivitis in Ghana." *Ghana Medical Journal*, 9, 1, 9-11, 1970.
3. ———: "Unusual Type of Epidemic Conjunctivitis in Ghana." *British Journal of Ophth.*, 54, 9, 628-630, 1970.
4. Diallo, J., Castets, M., Bassabi, S. and Marty: "A propos d'une conjonctivite hemorragique epidemique." *Bull. Soc. Med. Afr. noire de langue Francaise*, 16, 1, 73-75, 1971.
5. Kono, R., Sasagawa, A., Ishir, K., Sugiura, S. and Matsumiya, H.: "Pandemic of New Type of Conjunctivitis." *Lancet*, 1, 1191-1194, 1972.
6. Leading Article: *Lancet*, 1, 86, 1973.
7. Lim, K.H. and Yin-Murphy, M.: "Preliminary Report on an Epidemic of Conjunctivitis in Singapore in 1970." *Proceedings, Sixth Singapore-Malaysia Congress of Medicine, Singapore*, 310-314, 1971.

8. ———: "An Epidemic of Conjunctivitis in Singapore in 1970." *Singapore Medical Journal*, 12, 5, 247-249, 1971.
 9. ———: "Epidemic Conjunctivitis in Singapore in 1970 and 1971." *Transactions, Fourth Congress, Asia-Pacific Academy of Ophth., Auckland, April 13, (in the press), 1972.*
 10. Maitchouk, I.: "Epidemic Haemorrhagic Conjunctivitis. Pandemic of a new type of virus eye disease." WHO Document E.M.R.O. Memorandum, 1828, EM/VIR/3, 1972.
 11. Mitsui, Y., Kajima, M., Matsumuza, K. and Shiota, H.: "Haemorrhagic Conjunctivitis, a new type of epidemic Viral Keratoconjunctivitis." *Japanese Journal of Ophth.*, 16, 2, 33-40, 1972.
 12. Parrott, W. F.: "An Epidemic called Apollo. An outbreak of Conjunctivitis in Nigeria." *Practitioner*, 206, 253-255, 1971.
 13. Salim, I.: Personal Communication, 1972.
 14. Troutman, R. C.: Personal Communication, 1972.
 15. Tung, P. D.: Personal Communication, 1972.
 16. Yin-Murphy, M.: "An Epidemic of Picornavirus Conjunctivitis in Singapore." *South East Asian Journal of Tropical Medicine and Public Health*, 3, 303-309, 1972.
 17. ———: Ibid, "The Picornaviruses of Epidemic Conjunctivitis." 4, 11-14, 1973.
 18. Yin-Murphy, M. and Lim, K. H.: "Picornavirus Epidemic Conjunctivitis in Singapore." *Lancet*, 2, 857-858, 1972.
-