

# Adenovirus type 21 keratoconjunctivitis

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**SUMMARY** A case of keratoconjunctivitis caused by adenovirus type 21 in London has been described. A 59-year-old woman attended hospital in August 1974 complaining of a 3-week history of redness, grittiness, watery discharge, and photophobia in her left eye and a slight upper respiratory infection. Clinical examination showed a moderate follicular conjunctivitis mainly in the lower and upper fornices, which lasted for 6 weeks. In the cornea a moderate amount of epithelial and subepithelial punctate keratitis was observed. The subepithelial opacities were coarse, discrete, and round and lasted for 4 months. The course of follicular conjunctivitis and the subepithelial punctate keratitis in this patient was similar to epidemic keratoconjunctivitis caused by adenovirus 8. A conjunctival swabbing collected from this patient was positive for adenovirus serotype 21.

Adenovirus types 2, 3, 4, 5, 7, 8, 11, 13, 14, 15, and 19 have been isolated from the eyes of patients suffering from keratoconjunctivitis (Editorial, 1977). Adenovirus types 3 and 7 are the commonest causes of sporadic keratoconjunctivitis, and adenovirus 8 is generally associated with outbreaks of epidemic keratoconjunctivitis. Adenovirus 19 in recent years has been responsible for sporadic cases as well as the outbreaks of keratoconjunctivitis resembling epidemic keratoconjunctivitis in several countries (Hierholzer *et al.*, 1974; Darougar *et al.*, 1977).

Adenovirus 21 was first isolated from a Saudi Arabian patient with signs of trachoma (Bell *et al.*, 1960). Subsequently the agent was isolated in Holland, India, and the United Kingdom from patients suffering from respiratory infections (McDonald *et al.*, 1962; Kurian *et al.*, 1962; Pereira, 1963). Follicular conjunctivitis caused by adenovirus 21 has been reported in a family in Italy (Piazza and Paradisi, 1968).

This paper reports a case of follicular conjunctivitis with subepithelial punctate keratitis caused by adenovirus 21 in London. This is the first report of adenovirus 21 keratoconjunctivitis in the United Kingdom.

## Case history

A 59-year-old married woman attended the External

Eye Diseases Clinic of Moorfields Eye Hospital in August 1974 complaining of redness, grittiness, watering, discharge, and photophobia in her left eye for 3 weeks. She had a slight upper respiratory infection with coughing that had begun just before the conjunctivitis. There was no known contact with ocular or respiratory infection. One year earlier this patient had had a mild papillary conjunctivitis with watering and grittiness.

The unaided visual acuity was 6/18 in both eyes. There was slight ptosis in the left eye and the bulbar conjunctiva was slightly hyperaemic. Slit-lamp examination of the left eye showed moderate palpebral papillary hyperplasia, especially in the upper tarsal conjunctiva, and a moderate follicular hypertrophy with small, discrete, and gelatinous follicles mainly in the upper and lower fornices. The cornea showed moderate epithelial and subepithelial punctate keratitis in the interpalpebral area. The subepithelial opacities (10 to 15) were coarse, discrete, and round with regular margins. Some of these opacities were visible with the naked eye. No abnormality was observed in the uveal tract or fundus of this eye. The right eye was normal except for a few papillae and old follicles. Treatment with chloramphenicol eye drops 5 times daily, which had been prescribed by her family doctor, was continued.

Three weeks later (6 weeks from the onset) she was asymptomatic. There was no abnormality in the lids, bulbar conjunctiva, or palpebral conjunctiva, except for a few papillae and old follicles. The

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subepithelial punctate keratitis was still present. Three months later (18 weeks from the onset) the keratitis had completely resolved.

Swabs from the conjunctiva of the left eye were collected 3 weeks after the onset of the infection and were inoculated into 2 tubes of embryonic kidney cells (HEK) (McSwiggan *et al.*, 1975). The first cytopathic effect (CPE) appeared towards the end of the second week. The second and third passage of the virus in HEP2 cells produced CPE in less than 4 days. Adenovirus 21 was identified by the standard neutralisation test. The complement fixation test on blood samples collected 3 weeks and 6 weeks after the onset showed a steady titre of 1/40 against adenovirus group antigen.

**Discussion**

Adenovirus 21 was associated with outbreaks of respiratory infection among military recruits in Holland and India (McDonald *et al.*, 1962; Kurian *et al.*, 1962). In the United Kingdom the virus has been isolated from patients of all ages, causing severe respiratory disease among infants and a milder disease in older patients (Pereira, 1963). The isolation of adenovirus 21 from the stools of apparently normal children and the detection of specific antibodies in the sera of adults (Pereira, 1963) suggests that the virus has been prevalent in the United Kingdom.

Ocular infection with adenovirus 21 has not been reported since the original isolation in Saudi Arabia in 1960 except in a family in Italy (Piazza and Paradisi, 1968). Six children belonging to that family developed unilateral or bilateral follicular conjunctivitis without keratitis which lasted for 2 weeks. The eye infection was accompanied by pharyngitis, nasal congestion, and general malaise. No ocular or respiratory infection was observed in the parents.

In the case of our patient there was no evidence of ocular or respiratory infection in her family or contacts, nor was there any evidence of major ocular viral outbreaks in London at that time. The moderate follicular conjunctivitis recorded in this patient was observed 3 weeks after the onset of her

infection and may have been preceded by more severe inflammation. However, the long course of conjunctivitis (6 weeks), the low-grade associated upper respiratory infection, and the type, as well as the size, of subepithelial punctate keratitis were similar to the keratoconjunctivitis caused by adenovirus 8 or 19 (Jones 1962; Darougar *et al.*, 1977). The isolation of adenovirus 21 from the eye indicates that adenovirus 21, which is prevalent in the United Kingdom and commonly isolated from stools (Pereira, 1963), may be a potential cause of sporadic cases or institutional outbreaks of keratoconjunctivitis.

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