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The presentation and incidence of paratrachoma in adults

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SUMMARY

Thirteen definite and 3 probable cases of chlamydial eye infection were diagnosed in young adults attending the Bristol Eye Hospital between June 1978 and May 1980, an incidence of about 1 case per 44 000 per year in the 15 to 44-year-old community served by this hospital, and 1 per 100 000 in the total population of this community. These patients presented with a sub-acute follicular conjunctivitis or kerato-conjunctivitis, which had usually been present for several weeks and had often failed to respond to topical chloramphenicol treatment before presentation. Sera obtained from 14 patients all had chlamydial antibody titres of 64 or more. Over the same period of time, an estimated 2500 patients per year from the same community attended the Venereology Department at the Bristol Royal Infirmary with genital chlamydial infections. These figures suggest that chlamydial infection of the eye complicates no more than 1 in 300 chlamydial infections of the genital tract in adults.

INTRODUCTION

Chlamydia trachomatis has been recognized as an ocular pathogen for many years, and both epidemiologically and immunologically it is possible to distinguish two distinct groups of these trachoma-inclusion conjuctivitis (TRIC) agents: ocular chlamydia (serotypes A, B and C) which spread from eye to eye and cause classical trachoma, and genital chlamydia (serotypes D–K) which are sexually transmitted, but which cause sporadic eye disease known as paratrachoma (Editorial, 1977) in neonates and young adults where organisms are transmitted to the eye from the genital tract. Eye disease in adults caused by genital chlamydia generally presents as a sub-acute or chronic follicular conjunctivitis (inclusion conjunctivitis), sometimes with an accompanying superficial punctate keratitis (Editorial, 1977).

Recent studies with newly developed cell culture methods for isolation of *C. trachomatis* have shown that there is a large reservoir of genital chlamydia in the genital tract of young, sexually promiscuous populations in Western societies

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(Richmond & Oriel, 1978; Dunlop, Darougar & Treharne, 1980), and prospective studies suggest that up to one in three babies born to mothers with chlamydia-infected cervices may develop a chlamydial ophthalmia in the neonatal period (Alexander *et al.* 1977; Schachter *et al.* 1979). Little information is available, however, on the risk of paratrachoma developing in adults with a genital chlamydial infection. Earlier studies in Bristol identified 163 genital chlamydial infections in 573 patients who attended the Sexually Transmitted Disease (STD) Clinic at the Bristol Royal Infirmary. Only one of these 163 patients with genital chlamydial infections had obvious conjunctivitis associated with isolation of the agent from the eye (Richmond, Hilton & Clarke, 1972; Hilton *et al.* 1974), which suggested that overt chlamydial eye infections in adults are a relatively uncommon complication of a genital chlamydial infection.

The Bristol Eye Hospital serves a predominantly urban population of about 800000 people, and facilities for the diagnosis, treatment and exclusion of sexually transmitted infections are provided for the same community by the Venereology Department at the Bristol Royal Infirmary. Laboratory diagnosis of chlamydial infections in patients attending either of these hospitals is provided by the Bristol Public Health Laboratory. The present work describes 13 definite and three probable cases of chlamydial conjunctivitis or kerato-conjunctivitis diagnosed in young adults who attended the Eye Hospital over a two-year period, and discusses the relative incidence of chlamydial infections of the eye and genital tract in this community. Findings suggest that eye infections occur in not more than 0·3% of patients with genital tract infections.

SUBJECTS AND METHODS

Study group

This consisted of all patients who attended the Eye Hospital in whom a diagnosis of paratrachoma was made during the period from 1 June 1978 to 31 May 1980. Any patient in whom this diagnosis was suspected on clinical grounds was subjected to examination of the external eye, and conjunctival swabs were taken for isolation of *C. trachomatis*. Subsequent management of patients in whom the diagnosis of paratrachoma was made included both topical and systemic tetracycline treatment, and patients and their sexual partners were encouraged to attend the STD clinic to ensure adequate treatment of the chlamydial infection and to exclude the possibility of other sexually transmitted infections.

Isolation of C. trachomatis

Specimens for isolation of *C. trachomatis* were obtained by thorough swabbing of the lower conjunctival fornix with a sterile plain cotton-wool swab, which was then placed in sorbitol transport medium (Richmond, 1974) and kept at 4 °C until it was delivered to the laboratory. Specimens were then either inoculated into cell cultures within a few hours or they were snap-frozen and stored at −70 °C for not more than 3 weeks. Isolation of *C. trachomatis* was attempted in McCoy cells treated with cytochalasin B (Sompolinsky & Richmond, 1974).

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Serology

One or more serum samples were obtained from all but 2 patients from whom *C. trachomatis* was isolated. These sera were stored at −20 °C until they were tested for chlamydial antibodies in an indirect immunofluorescence test in which the inclusions of *C. trachomatis* serotype L2 grown in McCoy cell monolayers formed the antigen (Richmond & Caul, 1975; Gump *et al.* 1980).

RESULTS

Definite cases

During the study period, chlamydial isolation was attempted in 449 patients, excluding babies and young children suspected of having a neonatally acquired chlamydial conjunctivitis, and *C. trachomatis* was isolated from seven women and six men. All but one of these 13 patients were single and their ages ranged from 16 to 42 years (mean 23 years); they had not visited countries where trachoma is endemic. The time from onset of symptoms to presentation to an ophthalmologist ranged from four days to three months (mean 23 days). Eight patients were referred to the Eye Hospital by a general practitioner, often after unsuccessful treatment of the conjunctivitis with topical chloramphenicol, and two patients were referred from a local general casualty department. The remaining three patients attended the Eye Hospital without prior referral by another doctor. The diagnosis of chlamydial conjunctivitis was raised as a possibility in eight patients at their first visit. In the remaining five patients, the diagnosis was considered after a delay which ranged from three days to five months. Swabs for isolation of chlamydia were taken between four days and five months after onset of symptoms.

The commonest presenting complaint was soreness of the eye (nine patients), followed by stickiness (six patients), watering (five patients), photophobia (three patients) and blurring of vision related to corneal lesions (three patients). Nine patients had symptoms and signs in one eye only, three complained of symptoms in one eye only but follicles were seen in the lower lateral fornix and upper lateral tarsal conjunctiva of the contralateral eye. Two patients had symptoms and signs in both eyes. The physical signs found on examination are summarized in Table 1.

No patients complained spontaneously of concurrent symptoms, such as dysuria and urethral or vaginal discharge, which could be related to infection of the lower genital tract, and nine patients directly questioned after the diagnosis had been established denied any such symptoms.

Serological findings

Twenty-one serum samples were obtained from 11 of the 13 patients between seven days and 21 months after onset of symptoms; five of these samples were taken after tetracycline treatment. All sera had chlamydial antibody titres of 64 or more; titres tended to increase as duration of symptoms increased, and they remained high in follow-up specimens obtained after tetracyclines had been given (Table 2).

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Table 1. *Distribution and frequency of signs of eye infection in 13 adult patients with paratrachoma*

Site	Sign	Number of patients in whom sign present
Lids	Lid swelling	9
	Follicles in upper fornix	13
	Follicles in lower fornix	13
Conjunctiva	Chemosis	1
	Discharge	4
Cornea	Punctate epithelial keratitis	6
	Subepithelial opacities	4
	Pannus	5
	Epithelial oedema	1

Probable cases

Three additional male patients in this study, aged 19, 22 and 23 years respectively, had symptoms and signs that were very suggestive of chlamydial conjunctivitis, but *C. trachomatis* was not isolated from their conjunctiva. These patients all complained of a sore, watering eye; symptoms had been present for more than two months in each case. They had all received topical antibiotics, with temporary improvement in symptoms, before they attended the Eye Hospital. One patient was using topical tetracycline and one was using topical chloramphenicol at the time swabs for isolation of *C. trachomatis* were taken. On examination these patients had upper lid swelling, a follicular conjunctivitis and a punctate keratitis in the affected eye, and pannus was present in addition in one patient. Sera from all three patients had high chlamydial antibody titres (512 or 1024). One patient was married and *C. trachomatis* was isolated from the cervix of his wife, when she attended the STD clinic on advice, about four months after onset of her husband's ocular symptoms. The conjunctivitis in each patient responded well to treatment with tetracycline.

Incidence of inclusion conjunctivitis in patients attending the Eye Hospital

If the three probable cases are included, 16 patients with paratrachoma were seen at the Bristol Eye Hospital during the two-year study period. During this time 29931 new patients attended the Eye Hospital Casualty Department, which emphasizes that paratrachoma in adults is a rare condition, affecting only about 1 in 2000 patients attending this clinic.

DISCUSSION

The clinical features of the 13 patients with definite chlamydial eye infection confirm the well-documented range of signs which may result from infection of the eye by genital chlamydia (Jones, 1964; Editorial, 1977). The sub-acute nature of this condition is suggested both by the number of patients in the group who attended their general practitioner rather than the Eye Hospital initially, and by the appreciable length of history (mean 23 days) in many of these patients before they presented at the Eye Hospital. This long history may also reflect the temporary improvement in symptoms that occurs after topical chloramphenicol

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Table 2. *Chlamydial antibody titres in* 21 *sera from* 11 *adult patients with paratrachoma*

	Time after onset of symptoms		
	2 weeks	2–6 weeks	7 weeks–21 months
Number of sera	1	7	13*
Geometric mean titre (range)	64	380 (128–2048)	634 (128–2048)

* Tetracycline treatment was given before five of these sera were obtained. Geometric mean titre of these five sera was 565.

Table 3. *Estimated number of genital chlamydial infections in new patients attending the Venereology Department at the Bristol Royal Infirmary during* 1978

	Men with non-gonococcal urethritis	Men with gonorrhoea	Women	Total
Total number of patients*	2845	813	3798	7456
Estimated number of chlamydia-infected patients†	1422	244	760	2426

* Based on figures reported by the Venereology Department to the Department of Health and Social Security.

† Estimations assume a chlamydia-infection rate of 50% in men with non-gonococcal urethritis, 30% in men with gonorrhoea and 20% in women.

treatment, which several of these patients had been prescribed by their family practitioners. However, whilst not resolving the conjunctivitis, chloramphenicol undoubtedly makes isolation of the causative organism more difficult (Ridgway & Oriel, 1980).

The diagnosis in five patients was delayed by an average of nine weeks after they presented to the Eye Hospital. This confirms the need for alertness in considering this rare infection in the differential diagnosis of follicular conjunctivitis in young adults, in particular when symptoms have persisted for a number of weeks.

Sera obtained from 14 patients (11 with definite and three with probable chlamydial eye infection) all had high levels of chlamydial antibodies, and the geometric mean titre (GMT) was higher than that found in sera from patients with uncomplicated genital chlamydial infections tested by the same method, where the GMT in men was 29 and in women 75 (Richmond & Caul, 1977). This suggests that testing even a single serum sample for chlamydial antibodies is a useful laboratory test in the differential diagnosis of sub-acute follicular conjunctivitis, provided that symptoms have lasted for more than two weeks (Table 2).

Although infection is acquired from the genital tract, all patients who were directly questioned denied any symptoms suggestive of lower genital tract infection, and considerable difficulty was experienced in persuading patients attending an eye clinic to visit the Venereology Department. This emphasizes the fact that chlamydial infections that are restricted to the genital tract are often

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asymptomatic, and do not necessarily prompt the patient to seek medical attention.

The Eye Hospital and the STD clinic at the Bristol Royal Infirmary both serve the same community and about 350000 people in this population are aged between 15 and 44 years (information supplied by the County of Avon Planning Department). Genital and oculo-genital chlamydial infections generally occur within this age range. The 16 cases of paratrachoma diagnosed at the Eye Hospital in patients of this age suggest that the incidence of this condition amongst 15 to 44-year-olds in the Bristol area is of the order of 1 in 44000 per year. In contrast, about 2500 patients within approximately the same age range attend the STD clinic with genital chlamydial infections each year, an incidence of about 1 in 140 per year in the same community. The latter estimate is based on figures shown in Table 3, obtained from reports made by the Department of Venereology to the Department of Health and Social Security in 1978; it assumes that 50% of men with non-gonococcal urethritis and 30% of men with gonorrhoea are infected with chlamydia (Taylor-Robinson & Thomas, 1980), and that 20% of all new female attenders are also infected (Richmond, Paul & Taylor, 1980). From these figures it appears that chlamydial conjunctivitis is a complication of no more than 1 in 300 (0·3%) of genital chlamydial infections.

Clearly these estimates represent only rough approximations of the true incidence of genital and ocular chlamydial infection in the community. The number of genital infections in particular is likely to have been higher since, as already emphasized, these infections may be silent. Nevertheless these figures emphasize how common genital chlamydial infections are in this young adult community, and how uncommonly these infections are complicated by eye disease.

Persistent excretion of infectious organisms is well documented in genital chlamydial infections, particularly in women (Dunlop, Darougar & Treharne, 1980). It is therefore interesting that ocular complications in adults are so uncommon. Oral immunization of guinea-pigs with a live *C. psittaci* strain has been shown to protect against chlamydial infection of the eye and genital tract in these animals (Nichols, Murray & Nisson, 1978), which suggests that infection of one mucosal surface generates immune responses which protect other mucosal surfaces against infection with the same organism. It is therefore possible that a genital chlamydial infection in humans may protect against subsequent conjunctival infection. Conversely conjunctival infection in childhood in trachoma-endemic areas may modify subsequent genital tract infection. No information, however, is available at present on the relative incidence of ocular and genital chlamydial infections in areas where trachoma is common.

We are grateful to the medical and nursing staff at the Bristol Eye Hospital for their co-operation, to Ian Paul at the Bristol Public Health Laboratory for expert technical assistance, and to the Venereology Department at the Bristol Royal Infirmary for supplying the attendance figures at the STD clinic.

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