Branhamella keratitis

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SUMMARY Three cases of suppurative keratitis caused by *Branhamella catarrhalis* are described. Each presented as a localised stromal infiltrate in a previously scarred cornea. The condition responded to penicillin G and to gentamicin treatment.

Branhamella catarrhalis is a parasitic, commensal organism found in the normal nasopharynx¹ and conjunctiva^{2,3} which can exceptionally cause an acute or chronic catarrhal conjunctivitis that usually heals without serious sequelae when treated. It can also be a cause of suppurative keratitis, and we report 3 cases associated with this organism.

Material and methods

Corneal scrapings of the suppurative ulcerations were examined microscopically by Gram-stained smears. Scrapings were inoculated directly on to 2 blood agar plates. One plate was incubated aerobically and the other was incubated in an atmosphere of 10% CO₂. Robertson's cooked meat broth, tryptic digest broth, and thioglycollate broth were also inoculated. Sabouraud's agar and brain-heart infusion broth containing 100 µg/ml of chloramphenicol were inoculated for fungal isolation.

Micro-organisms were identified according to the methods outlined by Cowan and Steel.⁴ *Branhamella catarrhalis* is a Gram-negative diplococcus which was identified further on the basis of the following characteristics: oxidase positive, catalase positive, no haemolysis on blood agar, no production of pigment, no growth on MacConkey's agar, growth on nutrient agar, and weak growth when incubated at 22°C for 24 hours. No acid was produced from glucose, maltose, lactose, sucrose, or fructose. Nitrates were reduced to nitrites; indole and urease tests were negative.

Case reports

CASE 1

A 63-year-old male initially presented during 1970

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with a herpetic dendritic keratitis which was treated with idoxuridine. He subsequently developed a disciform keratouveitis, and prednisolone phosphate 0.1% and atropine were administered. Two weeks later he returned with a central suppurative ulceration with hypopyon. Corneal scrapings grew a penicillinase-producing *Staphylococcus aureus* which was treated with topical methicillin and gentamicin. A topical steroid was administered when repeat cultures were sterile. Because of residual vascularisation and scarring an 8.1 mm penetrating keratoplasty with cataract extraction was performed 6 months later. Postoperatively vision improved to 6/12.

He remained asymptomatic until 1979, when he returned with a 2-day history of ocular pain and epiphora. Examination revealed vision reduced to light perception because of a central ulcerative suppurative keratitis with hypopyon. Microscopic examination of the corneal scrapings showed Gram-negative diplococci and inflammatory cells. Treatment was begun with subconjunctival gentamicin 20 mg, topical gentamicin 3 mg/ml 3-hourly, and atropine. Cultures grew a pure heavy growth of *Branhamella catarrhalis* on blood agar. Antibiotic sensitivity testing by the disc-diffusion method showed the organism to be sensitive to penicillin G, ampicillin, gentamicin, tetracycline, chloramphenicol, neomycin, and soframycin. The hypopyon and stromal infiltrate rapidly began to resolve. Repeat corneal scrapings on the third day of treatment showed no organisms microscopically, and cultures were sterile. Prednisolone phosphate 0.3% was begun and later changed to dexamethasone 0.1% 4-hourly. The topical gentamicin was gradually decreased over a 3-week period. An indolent epithelial ulceration persisted, and subsequent viral culture was negative. A central tarsorrhaphy was performed, and the cornea slowly re-epithelialised with residual stromal scarring.

CASE 2

A 9-year-old male was followed up from 1977 for asthma and vernal keratoconjunctivitis which had been treated with topical betamethasone and sodium cromoglycate. A pneumococcal corneal ulcer of the left eye occurred during 1978 which was treated with topical and systemic penicillin. Subsequent therapy included topical prednisolone phosphate 0.3% and sodium cromoglycate 3 times daily to both eyes.

He returned 1 year later with a 2-day history of a painful right eye. Examination revealed a vision of 6/60 with a 5.5-mm² elliptical stromal abscess of

Fig. 1 Case 2. A suppurative stromal abscess is present within the inferior cornea in association with vernal conjunctivitis.

Fig. 2 Case 3. An oedematous corneal graft developed stromal infiltration with an underlying plaque on the endothelial surface.

the inferior cornea (Fig. 1). Gram staining of corneal scrapings showed many inflammatory cells, but no micro-organisms were seen. Treatment was begun with subconjunctival gentamicin 10 mg and penicillin G 250 000 units. Topical gentamicin and penicillin G were administered hourly and atropine 6-hourly. Cultures subsequently showed a pure moderate growth of *Branhamella catarrhalis*. Disc sensitivity testing showed the organism to be sensitive to penicillin G, ampicillin, gentamicin, tetracycline, chloramphenicol, neomycin, and soframycin. The gentamicin was then stopped, and treatment was continued with topical penicillin G. The stromal oedema and infiltrate rapidly began to resolve, and the penicillin dose interval was gradually increased. Acetylcysteine 10% and dexamethasone 0.1% were administered from the eighth day of treatment. Vision improved to 6/9 with a small residual stromal scar.

CASE 3

A 61-year-old female with recurrent ulcerative herpetic keratitis since 1966 subsequently developed stromal keratitis and was treated with topical prednisolone phosphate 0.5%. Progressive thinning resulted in a central descemetocoele requiring a 7-mm penetrating keratoplasty. A graft rejection occurred 5 months postoperatively, which was controlled with intensive topical steroid therapy. The steroid treatment was complicated by a herpetic geographic ulcer. Because of persistent stromal oedema an 8.5-mm keratoplasty was performed 9 months later. Stromal vascularisation and oedema developed despite topical steroid, and treatment was reduced to prednisolone phosphate 0.01% twice daily. One month later she returned with a 2-day history of a red, painful eye. Biomicroscopy revealed a 1.8-mm² stromal infiltrate with a dense plaque on the posterior corneal surface (Fig. 2). Gram staining of corneal scrapings revealed large numbers of Gram-negative diplococci. Treatment was begun with subconjunctival gentamicin 20 mg and topical gentamicin 15 mg/ml. hourly. Cultures subsequently grew a pure heavy growth of *Branhamella catarrhalis* from the cornea. A few colonies were isolated from the conjunctiva, and lid cultures showed a heavy mixed growth of *B. catarrhalis*, *Staphylococcus epidermidis*, and *Corynebacteria*. Antibiotic sensitivity testing showed the *B. catarrhalis* to be sensitive to gentamicin, tetracycline, chloramphenicol, neomycin, soframycin, erythromycin, and trimethoprim-sulfamethoxazole. The organism was beta-lactamase-positive and showed resistance to penicillin G and ampicillin. The inflammatory plaque on the cornea resolved, and the stromal infiltrate became less dense with only

minimal residual corneal scarring. Vision remained at counting fingers because of corneal oedema and cataract.

Discussion

Branhamella catarrhalis is a Gram-negative aerobic diplococcus belonging to the family Neisseriaceae. Formerly known as *Micrococcus catarrhalis* and *Neisseria catarrhalis*, this organism was transferred to the new genus of *Branhamella* on the basis of its cellular composition and serological cross-reactions,^{5,6} though it has also been suggested that it be included with the *Moraxella*.⁷

The Neisseriaceae include *Neisseria*, *Branhamella*, *Moraxella*, and *Acinetobacter*, of which the first 3 are obligate parasites of the mucous membranes of warm-blooded animals. With the exception of *N. gonorrhoeae* and *N. meningitidis* they are usually opportunists with low pathogenic potential. The virulence of the pathogenic *Neisseria* as opposed to other *Neisseria* and *Branhamella* may be due to the presence of a lipopolysaccharide and an IgA protease,⁸ neither of which is present in complete form in *B. catarrhalis*.^{9,10}

While *B. catarrhalis* is an unusual pathogen which tends to occur principally in immunocompromised individuals, it can be recovered from up to 9% of cases of otitis media in children¹¹ and 14% of pneumonias in patients with chronic bronchitis.¹² In addition the organism has been found in occasional cases of meningitis,¹³ endocarditis,¹⁴ and urethritis.¹⁵

Ocular infections due to *B. catarrhalis* include conjunctivitis,¹⁶ dacryocystitis,¹⁷ and endophthalmitis.¹⁸ The 3 cases of suppurative keratitis which we describe are the first in which corneal ulceration has been reported. The presence of Gram-negative diplococci in the smears of corneal scrapings of cases 1 and 3 and its isolation on culture media from all 3 cases suggest that *B. catarrhalis* was the responsible organism. The negative microscopical results from case 2 were probably due to sampling error. Caution must be exercised in the interpretation of smears, since *Moraxella* and *Acinetobacter* can be morphologically indistinguishable from *Neisseria* and *Branhamella*.

While there was no distinguishing clinical feature, each patient presented with a small localised stromal infiltrate or abscess in an area of previous corneal scarring which apparently predisposed to the secondary infection: 2 cases followed penetrating keratoplasty and the other occurred in association with vernal keratoconjunctivitis. The previous episodes of herpetic keratitis in 2 of the patients and the use of a topical corticosteroid in each case

may have additionally altered the local immunological defence mechanisms.

B. catarrhalis is generally susceptible to most antibiotics.¹⁹ The penicillins, including ampicillin, penicillin G, and penicillin V, are the most effective²⁰ followed by gentamicin, erythromycin, tetracycline, chloramphenicol, and neomycin. It is relatively resistant to vancomycin and clindamycin.¹⁴ However, recent reports have suggested an increasing occurrence of beta-lactamase production by the organism,²¹⁻²³ as we found in case 3. Since the cases of suppurative keratitis reported here showed improvement after therapy with penicillin G and gentamicin, these antibiotics should be considered for the initial therapy when the microscopical examination of corneal scrapings reveals Gram-negative cocci.

To identify accurately the causative agent of suppurative keratitis and to determine its antibiotic sensitivity, initial smears and cultures of corneal scrapings should be done whenever microbial keratitis is suspected. An organism which is normally considered to have very low pathogenicity such as *B. catarrhalis* can be capable of acting as an opportunistic pathogen in an immunologically compromised or structurally altered cornea.

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