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CASE REPORT

The cause of *Actinomyces canalictulis* – a case study

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Abstract

Actinomycosis of the lacrimal ducts is a rare chronic infection, caused by bacteria of the genus *Actinomyces*, usually *A. israelii*. The analyzed case of a 72-year-old man draws attention to the chronic nature of the infection and the need to thoroughly investigate the microbiological material sampled from the lacrimal ducts. Good effects of treatment resulted from oral use of doxycycline and local application of erythromycin. A precise removal of actinomycotic deposits and the applied antibiotic therapy resulted in a complete recovery without recurrences. The analyzed case confirms incidents in Poland of actinomycosis of the lacrimal ducts, and draws attention to this group of microorganisms that may cause infections in ophthalmology. This confirms the need for accurate diagnosis of microbial infections in the lacrimal ducts towards anaerobic bacteria. This would contribute to greater detection of a rare form of infection.

Key words

Actinomyces israelii canaliculitis, antibiotic therapy

INTRODUCTION

Species of the genus *Actinomyces* may cause serious infections in humans, known as actinomycosis, mainly located in the cervico-facial area. Their endogenous nature, differentiated location and characteristics of the microorganisms, and above all, the requirement of the anaerobic conditions for the growth, may cause serious problems in the microbial diagnostics and identification of the infection. The clinical picture results in frequent differetiation of many infection incidents caused by the *Actinomyces* species with cancer, especially when a pulmonary [1] or abdominal actinomycosis [2], or located within the lesser pelvis [3], is suspected. In most cases, the species causing infections is *Actinomyces israelii*, which is primarily responsible for the incidence of actinomycosis in humans. One form of actinomycosis which may cause difficulties in its diagnostics is dacryosolenitis [4]. Characteristic features of actinomytic inflammation of the lacrimal ducts include dense gray-yellow lump deposits (drusen) exuding from the site of changes, containing radially arranged Gram-positive actinomycetes, most often of the species *A. Israelii,* visible in the microscopic slide. They were observed and described for the first time in 1854 by von Graefe. The discoverer of actinomycosis in humans was Adolf James Izrael who in 1878 was the first to diagnose incidents of actinomycosis in his patients; the acynomyces isolated from the infection and described by him in 1891was named *A. israelii* in his honour. Currently, dacryosolenitis in humans caused by *A. israelii* accounts for about 2% of all lacrimal duct diseases and affects both males and females, mostly older than 40 years of age [4, 5, 6, 7].

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The aim of the presented study was to analyze a case of chronic infection of the lacrimal ducts caused by *A. israelii*, and characterise the conducted diagnostics in comparison to the data presented in literature describing similar cases of infections, as well as the problems arising from such a non-typical location of actinomycosis.

MATERIALS AND METHODS

The examined patient was a 72-year-old retired railway worker who reported to the Regional Eye Clinic in Lublin due to recurrent inflammation of the conjunctival sac of his left eye (lasting for about a year). The patient complained of chronic lachrymation, irritation and discomfort in his left eye which did not disappear despite local treatment with such preparations as Dicortineff (fludrocortisone acetate, gramicidin, neomycin), neomycin and gentamicin. Ophthalmic examination of the soft tissue showed swelling around the medial angle of the left eye, combined with the expansion and swelling of the lacrimal punctum, and conjunctivitis of the left eye. While pressing the area of the medial angle and the lacrimal ducts from the bottom of the lacrimal punctum, initially a fairly large amount of mucous-purulent discharge was ecuded, followed by lumps of dense gray-yellow material which were diagnosed as drusen. The cornea of the left eye was normal, the fluid of the anterior chamber clear, the iris normal, pupil moderately broad and round. The lens showed initial turbidity, grey in colour. The bottom of the eye was normal for the age of the patient. V.o.s. = 0.8. The condition of the right eye was normal.

After administration of local anesthetic with Alcaine drops, massages and flushes of the lacrimal ducts were performed repeatedly at intervals of several days. This resulted in the removal of large amounts of purulent discharge and drusen from the lower duct (Fig. 1). No decision was made

to introduce a more invasive treatment, i.e. incision of the lacrimal ducts, due to the unstable coronary heart disease of the patient (he did not report any other general diseases). The material sampled while flushing was used to carry out the microbiological examination.

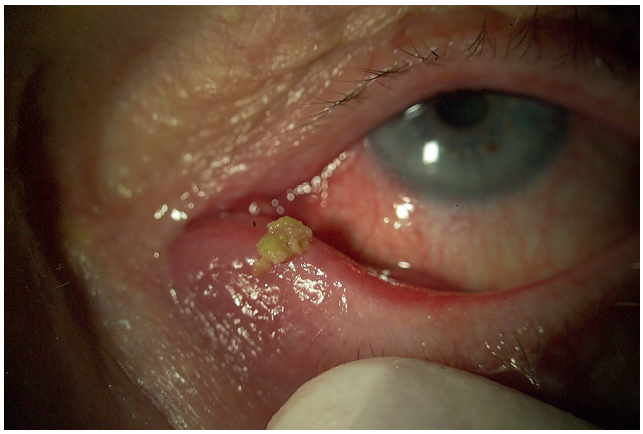

Figure 1. The eye with actinomytic inflammation of the lacrimal ducts.

Microbiological examination. A Gram-stained preparation was obtained from the lumps – drusen from the lacrimal duct (Fig. 2.) The material was cultured on substrate Columbia agar with 5% sheep blood and incubated anaerobically for 7 days. Species identification was based on morphological and biochemical properties using a set of Rapid ID32A (bioMerieux), based on the diagnostic scheme used to identify species of the genus *Actinomyces* recommended by Sarkonen et al. [8].

Figure 2. Actinomytic drusen obtained from the lacrimal ducts.

RESULTS

Gram-positive, branched and radially arranged actinomycetes were found in the direct preparation made from the sampled drusen from the lacrimal ducts. Colonies characteristic of *A. israelii* were cultured after 7 days of incubation on the Columbia agar substrate with 5% sheep blood. A microscopic slide made from the colonies confirmed actinomycosis. Identification of the species *A. israelii* was performed on the basis of biochemical properties by reading the results from the Rapid ID32A in a numerical code using apiweb (bioMerieux). Empirical antibiotic therapy was applied. Doxycycline at a dose of 200mg, then 100mg for 2 weeks, and Erythromycin Oftalmosa Cusi ointment locally, three times a day. Penicillin was not used in the treatment due to the threat of anaphylactic shock. The patient felt well during the treatment and reported a noticeable, progressive, gradual improvement. Finally, recovery from the local inflammation of the lower lacrimal ducts was achieved. Currently, the patient reports for periodic eye checks, and no recurrence of the disease has been observed. Additionally, the patient was referred for a dental consultation and having a pantomogram made to exclude oral actinomycosis. To date, the patient has not consulted a dentist, due to the absence of pain in the oral cavity.

DISCUSSION

Actinomyces canaliculitis does not belong to the common bacterial infections of the lacrimal ducts. Actinomycosis in such an unusual location may pose problems in diagnostics and draws attention to its frequent preliminary wrong diagnosis [9]. This disease is manifested by excessive lachrymation, chronic conjunctivitis with purulent discharge, often with swelling and redness of the eyelids. There is pain during the examination. There is a characteristic distention of the lacrimal ducts, with the presence of lumpy yellowish discharge. In most cases, the disease involves a single duct, with a lower lacrimal duct more often being affected [6, 9]. Typically, when pressed, a discharge exudes in the form of characteristic dense granules and deposits. In particular, chronic or recurrent conjunctivitis [6, 9], inflammation of blepharitis, chalazion, stye, or lacrimal obstruction [4, 9, 10] are taken into account in differential diagnostics. Due to the chronic nature and progressive inflammatory symptoms, in most cases an appropriate diagnosis is possible after a long period of gradually increasing symptoms developing from several months to 4 years [9]. Due to the location of the infection in the eye-ball area and failure in taking a treatment or making a wrong diagnosis, the ongoing disease process may extend to the surrounding tissues and lead to a greater change simulating a tumour, cyst, or even a basal cell carcinoma [11].

Actinomycosis is considered a classic example of an endogenous infection in which bacteria originate from the natural flora contained in the oral cavity, particularly damaged decayed teeth, pockets in the gums, tonsils, gastrointestinal tract, and urogenital system. In the presented case, the source of actinomycosis infection is unknown. It is difficult to determine how the infection occurred, as described also in literature in cases of canaliculitis Actinomyces. Attention is directed to the old age of patients, predispositions of females, or a humid climate, which can affect the growth of the incidence of actinomycosis in, for example, Iceland, according to Baldursdóttir et al. [9]. The diagnosis is based on the microbiological examination of drusen obained from the lacrimal ducts with the characteristic appearance of grey-yellow lumps with a compact structure.

Actinomycetes are sensitive to penicillin antibiotics [12], which are most often used in the antibiotic therapy carried out for a period from 1 week to 6 months [4]. Good results of treatment were also found after application of cephazolin [13] and norfloxacin, levofloxacin and chloramphenicol [10]. Good effects were also achieved in treatment with doxycycline and erythromycin, in particular against the risk

of patient's hypersensitivity to penicillin [14, 15]. The need for a long antibiotic therapy may be related to the ability to form biofilms by *A. israelli*, which is more difficult to penetrate by antibiotics. It is believed that the most appropriate and most effective form of treatment is a mechanical removal of the deposits from the affected duct by squeezing, and an accurate curettage of the lacrimal duct (*canalicular curretage*) after expansion or an incision of the lacrimal punctum or an incission of the duct (canaliculotomy) [9,13,16,17]. Some authors suggest fixing drainage of lacrimal ducts to prevent a post-operation lacrimal stenosis [9]. Post-operatively, a local application of a broad-spectrum antibiotic for a period from 1 week to 1 month [6, 9] is recommended. It is emphasized that full recovery is possible only after a very thorough and complete elimination of lumps and deposits from the affected lacrimal duct. The prognosis in actinomycosis of the lacrimal ducts is very good if the disease is properly diagnosed (positive identification of the pathogen), and treated accordingly [9]. A late diagnosis often results in recurrences, in which 28% are mixed infections, involving mainly aerobic bacteria [18, 19].

CONCLUSIONS

Actinomycosis of the lacrimal ducts is rare and can cause diagnostic difficulties, whereas the chronic nature of the infection contributes to making mistakes in diagnostics. Because it is a rare infection, it may not always be properly recognized, resulting in many ophthalmologists not considering actinomycosis as the cause of inflammation of the lacrimal duct. The basis for properly performed diagnostic examinations is the appropriate sampling of the material, execution of the microscopic slides, and the cultivation and identification of Actinomyces. A complete removal of the deposited actinomytic grains from the lacrimal ducts is very important. In actinomytic infections, the presence of other microorganisms involved in the infection should be also taken into account, which may reduce the efficacy of an antibiotic therapy used only for actinomycosis. The antibiotic therapy should lead to a full eradication of microorganisms. Considering possible recurrences, it is necessary to conduct control checks in patients.

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