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DEMODEX FOLICULLORUM AND DEMODEX BREVIS ROLE IN CHRONIC BLEPHARITIS ETHIOPATOGENY

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ABSTRACT. Demodex is considered to play a role in the pathogenesis of chronic blepharitis. Demodex was found in hair's bulbs wich cause a loss of eyelashes, cylindrical dandruff and inflammatory processes. Demodex involvment in the pathogenesis of blepharitis is neglected by the physicians due to the large number of possible reasons for this disorder: bacterial infections, allergy, refractive errors wich are taken into account more often. Recently studies are showing that Demodex has a corelation with the presence of chronic blepharitis and with the severity of ocular surface disorders. The treatment with tea tree oil is an effective method to eliminate the mites.
KEY WORDS: Demodex, blepharitis, tea tree oil, ocular surface.

INTRODUCTION

Blepharitis is a common eye disorder characterized by chronic inflammation of the eyelid usualy bilateral and symmetrical. Blepharitis may be classified into anterior and posterior.

Demodex folliculorum and Demodex brevis are typically found on humans. Infestation with demodex is overlooked in the ophthalmological investigations and this may be the cause of treatment failure. The frequency of demodex infection increase with age but it can be found in teenagers also. (Jolanta Rusiecka Ziółkowska et al. 2014) Risk factors of Demodex blepharitis are rosacea, smoking, dust, sunlight exposure, alcohol intake, stress, spicy food and sudden changes in ambiental temperature. (Jingbo Liu et al 2010)

MICROSCOPIC FEATURES OF DEMODEX

The adult mites are only 0.3- 0.4 mm, D. brevis slightly short, with four pairs of well-developed legs. D. folliculorum is prone to cluster at the root of eyelashes leading to anterior blepharitis. D. brevis lives in sebaceous glands causing posterior blepharitis. They are transfered between hosts through contact with hair, eyebrows, sebaceous glands of the face and towels.

Fig. 1 Demodex folliculorum and Demodex brevis

PATHOGENESIS

Some studies indicates that demodex is a nonpathogenic parasite since the mites are found in healthy subjects, but other reports confirm that this mite is an ethiologic factor for chronic blepharitis.

An over-proliferation can lead to demodicosis wich can be the cause of anterior or posterior blepharitis.

Demodex infestation can lead to important ocular disorders. The folowing action mechanism is proposed to understand the pathogenic rol (Jingbo Liu et al 2010)

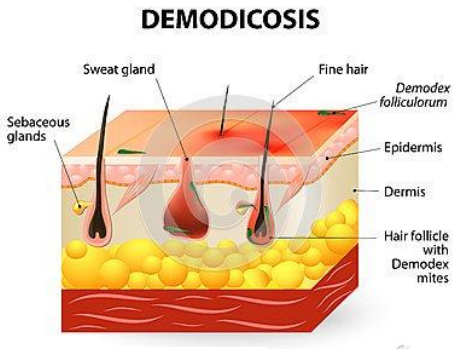

Fig. 2 Demodicosis of eyelashes

Direct damage

Demodex folliculorum especialy is occupying basal region of eyelashes and eyebrows and consume epithelial cells wich cause dislocation of the lashes wich are missdirected or lost. Infested follicles contain around 2-6 parasites. Demodex brevis can block the sebaceous ducts and may induce epithelial hyperplasia and hyperkeratosis, reccurence of chalazion and meibomian gland dysfunction with lipid tear deficiency.(Gao YY et al. 2007)

Carrier for bacteria

Demodex mites serve as a vector for bacteria such Staphylococci, Streptococci and also transmit viruses and fungi. The *Bacillus oleronius* bacteria found in the *Demodex* mite which most probably function as a co-pathogen, produce an antigen that

could be responsable for the tissue inflammation, stimulating proliferation of peripheral blood mononuclear cells.(Lacey N et al 2007)

Immune response

The protein inside the Demodex mites and their debris or wastes may elicit host's inflammatory responses via a delayed hypersensitivity or an innate immune response (Bevins CL 2007) An increased number of macrophages and Langerhans cells were observed only in those subjects with a positive *D.* folliculorum finding.(Jingbo Liu 2010)

CLINICAL MANIFESTATION

The majority of patients with chronic refractory blepharitis have simptoms lasting over six month despite extensive treatment with artificial tears, antibiotics, corticosteroids or baby shampoo lid scrubing. Patients complains are itching, burning sensation in the eye, crusting and redness, cylindrical dandruff, blepharoconjunctivitis and keratitis. Lipid tear deficiency apear as the result of inflamation and causing dry eye syndrome symptoms. Disorders of eyelashes such as, trichiasis or madarosis are more common in demodex blepharitis than in other forms of the disease.

DIAGNOSIS

The symptoms of demodex blepharitis, excepting cylindrical dandruff, are common with other external ocular diseases. Knowing this, when we have a patient with symptoms listed above, that are not responsive at conventional treatment, we can consider mite infection. First you have to know how to look and what you need to find to confirm the diagnosis, and after that you have to convince the patient that he has a mite infection, because they don't necessarily understand it or believe. This step is important, otherwise our patient will not be compliant to our treatment.

Using a slit lamp microscope we can show the presence of eyelashes with cylindrical dandruff. Using a fine forceps we epilate two lashes from each eyelid after wiggling the lashes to loosen the cylindical dandruff to increase the likelihood of detecting mites. The eyelashes are placed separately on each end of glass slides. One drop of fluoreceine or saline solution is apply on to the edge of the coverslip to surround the lash.

A coverslip is mounted onto each lash. This maneuver help us to preserve the Demodex. Put a cover slip over each slide and examine under a light microscope with 10X magnification. In the vast number of cases, the mites go unobserved and we can obtain erroneous negative results. Differential diagnosis is made with conjunctivitis (bacterial, viral and allergic), keratitis (bacterial, fungal and herpetic), keratoconjunctivitis (atopic, epidemic, sicca and superior limbic), dry eye syndrome. (Jingbo Liu et al 2010)

TREATMENT

Our aim is to eradicate the mites, prevent mating and avoid reinfestation. The treatment is difficult and may last for several month. The adult Demodex folliculorum mite is resistant to many common antiseptic solutions including 75% alcohool and various treatment have been used such as: local sulphuric ointment, antibiotics, pilocarpine gel, camphorated oil. The ocular demodex killing effects of tea tree oil in vivo and vitro has proven effective for eradicating ocular demodicosis. Weekly lid scrubs with 50% tea tree oil in the medical office and daily lid massage with 10% tea tree oil for minimum four weeks are effective in eradicating ocular Demodex. (Gao et al. 2005) Tea tree oil (TTO) has anti-inflammatory, antibacterial and antifungal properties. Besides treatment with TTO, the first treatment is hygiene. Also it is recommended to use warm compress that softens the crusts. For treatment success the patient must be compliant and report any local adverse effects wich may arrise, from mild irritation to superficial burns.

CONCLUSION

Many physicians do not recognize Demodex as a potential cause of blepharitis because it is present in asymptomatic patients. The diagnostic algorithm of a chronic blepharitis can be different from one physician to another, depending on the experience, gravity and plurality of the symptoms and presence or absence of corneal complications. For a more accurate ethiological diagnosis, further studies are needed to develope more effective and easy methods to identify those mites.

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