Investigating Estrogen and Progesterone Receptors in the Lacrimal Sacs of Individuals With and Without Chronic Dacryocystitis

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Abstract

Objectives: Chronic dacryocystitis is usually seen in middle-aged or older women, suggesting that decreased estrogen and progesterone serum levels may be a causative factor in the disease pathology. However, the occurrence of the disease in premenopausal females and males suggests that there may be more to the explanation than the level of female sex hormone. The purpose of the present study was to investigate estrogen and progesterone receptor positivity in the lacrimal sacs of individuals with and without chronic dacryocystitis.

Methods: The study group included 50 female and 20 male patients diagnosed with chronic dacryocystitis. Lacrimal sac samples were taken during a dacryocystorhinostomy. The control group comprised 29 cadavers with no evidence of lacrimal system pathology in the health records. The samples were obtained transconjunctivally. Lacrimal sac samples from both groups were stained with the estrogen and progesterone receptor protein antigen. Fisher’s exact test and a chi-square test were used to compare the receptor positivity results of premenopausal and postmenopausal women, and samples of those with dacryocystitis and cadaver sacs without the disease.

Results: In the control group, estrogen receptor positivity was observed in the samples of 2 premenopausal females. In the study group, estrogen receptor positivity was seen in 4 premenopausal females. There was no significant difference in estrogen receptor positivity between the premenopausal and postmenopausal female groups (p=0.41). A similar result was not established between the premenopausal and postmenopausal females in case group (p=0.056). No comparison was made of the progesterone receptor because only 1 example of progesterone receptor positivity was found in a premenopausal female in the dacryocystitis group.

Conclusion: Estrogen receptor positivity did not seem to be a factor in chronic dacryocystitis physiopathology.

Keywords: Dacryocystitis, estrogen receptor, inflammation, lacrimal sac, progesterone receptor.

Introduction

Chronic dacryocystitis is a long-lasting, non-infectious inflammation of the lacrimal sac that leads to epiphora (1). It is more common in females than males (2), which may be due, at least in part, to the anatomically narrower nasolacrimal duct in females (3). The exact pathophysiology is not clear. Age seems an important factor, since most chronic dacryocystitis patients are middle-aged, although young individuals may also be affected. A lack of the estrogen hormone may be a cause and explain the presence of the disease in some males, (4) but this does not explain the presence of chronic dacryocystitis in premenopausal females. The presence or
absence of the estrogen receptor in the lacrimal sac, rather
than the hormone, may be a factor in the development of
chronic dacryocystitis. The goal of the present study was to
investigate and compare the presence of estrogen and pro-
gesterone receptors in the lacrimal sacs of individuals with
and without chronic dacryocystitis.

Methods
This case-control study was reviewed and approved by the
Local Ethics Committees. Informed consent was obtained
from all of the participating patients. For the case group, 50
female patients (26 premenopausal and 24 postmenopausal)
and 20 male patients who had experienced eye tearing for a
long period of time were enrolled. A complete ophthalmic
examination was performed, followed by a Jones 1 test and
lacrimal irrigation test. External dacyrocystorrhinostomy was
performed using the Dupuy-Dutemps-Bourguet technique.
A lacrimal sac tissue sample approximately 3x4 mm in size
was removed from each patient.

The control group comprised 20 female (10 premenopausal
and 10 postmenopausal) and 9 male cadavers. These individu-
als did not have any known previous lacrimal disease and were
at least 18 years of age. Specimens of the lacrimal sac were
obtained using a transconjunctival approach.

The tissue taken from both groups was fixated in buffered
formalin solution, then dehydrated with alcohol and embed-
ded in paraffin. The tissue sections were prepared for patho-
logical examination: A portion of the sections was stained
with hematoxylin and eosin dye, and microwave antigen re-
trieval was performed for the remainder, followed by a strep-
tavidin-biotin application to reveal the estrogen and proges-
terone receptors (Dako Omnis; Aclent, Santa Clara, CA,
USA). The results were grouped as estrogen receptor-positive
(Fig. 1) or -negative and progesterone receptor-positive (Fig.
2) or -negative. The hematoxylin and eosin stain samples were
examined for signs of inflammation (Fig. 3). The case and con-
trol groups were divided into groups of males and females.
The female group was further divided into premenopausal and
postmenopausal individuals. The results were compared using
the Fisher’s exact Chi-square test.

Results
The mean age of the patients in the control group was
47.64±16.019 years and the mean age of the patients in the
case group was 50.53±4.571 years. The mean age of the men
and the premenopausal and postmenopausal women in both
the control and the case groups is provided in Table 1.

The positive and negative stain results are shown in Table
2 for the case group and in Table 3 for the control group.

Progesterone receptor positivity was found in only 1
premenopausal female in the case group. Estrogen receptor
positivity was found in 1 lacrimal sac of a male in the control
group; the remainder were estrogen receptor-negative. No
estrogen receptor staining positivity was found between the
case and control group. In the case group specimens, various
levels of fibrosis and vascular and lymphocytic proliferation
were observed.

Figure 1. Estrogen receptor positivity in the lacrimal sac of a pre-
menopausal female (Dako Omnis; Aclent, Santa Clara, CA, USA)

Figure 2. Progesterone receptor positivity in the lacrimal sac of a
premenopausal female (Dako Omnis; Aclent, Santa Clara, CA, USA).

Figure 3. Inflammation and fibrosis in a lacrimal sac (hematoxylin
and eosin).
Discussion

Chronic dacryocystitis is commonly seen in middle-aged women (5). The mean age of the cases in our study was 47.64±16.019 years, which was similar to the results of Yang and Majidaee (6). The age range was also similar. But as noted here and in previous research, the disease can also occur in younger individuals. In the pathology sections, we observed established fibrosis and various degrees of lymphocyte and plasmocyte infiltration in the sac wall of the chronic dacryocystitis patients, similar to the findings of Mauriello et al. (7-9).

Inflammatory infiltrates may be due to autoimmune disease (10). Estrogen may affect the immune system; for example, hormones may be related to Schögren’s syndrome (11). Furthermore, it has been established that estrogen has an influence on prolonged cell activity in rheumatoid arthritis and systemic lupus erythematosus (12). The uveitis rat model conducted by Buggage et al. (13) demonstrated that estrogen could be useful in the pre-treatment of uveitis. The study also demonstrated a regulatory effect of estrogen in inflammation.

In menopause, the monocyte level in human blood increases; however, the level of estrogen-receptors in peripheral monocytes decreases (14). This suggests that estrogen may affect monocytes, but the roles of sex hormones roles in immunity are not yet well understood, considering that our receptor-positive cases were premenopausal females, not postmenopausal.

During the menstrual cycle, changes occur in the corneal thickness, the volume of lacrimal tears, and the velocity of tears through the nasolacrimal duct (15). Tear production increases during menstruation, and with additional factors, this may enhance stasis and consequently result in infection. However, this does not explain disease in postmenopausal and male cases.

Studies have examined estrogen receptors in ocular and periorcular structures. An experimental study by Wickham et al. (16) conducted with male and female rats, mice, hamsters, and guinea pigs, found sex steroid receptors and mRNA in the ocular structures of all of these animals. There are estradiol receptors in the human nasal mucosa, oral, parotid glands, and submandibular glands (17). We found only 1 example of research about estrogen receptors in the human lacrimal sac. Gupta et al. (18) performed a dacryocystorhinostomy on 20 individuals with dacryocystitis and examination of the tissue did not reveal estrogen and progesterone receptor positivity. The diagnostic method used was similar to that of our study and the results appear to support our findings. It was interesting for us to found estrogen receptor positivity in only premenopausal females, but this weakens our theory for the other receptors. Only 1 lacrimal sac tissue sample of a premenopausal female in the case group stained positively for the progesterone receptor; thus, we could not perform a statistical analysis for that hormone receptor.

Disclosures

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Involved in design and conduct of the study (OB); preparation and review of the study (HB); data collection (HHU); and statistical analysis (YK).

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