Type and Severity of Dry Eye in Collagen Vascular Diseases

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Abstract

Collagen Vascular Diseases (CVD) are autoimmune disorders characterized by chronic inflammatory infiltration of exocrine glands and systemic immune reactivity. The severity of dry eye disease in autoimmune disorders is not clear in literature. If detected early and treated, the quality of vision can be improved and structural damage to the ocular surface can be minimized. This study tried to identify the type and severity of dry eye in Collagen Vascular Diseases. This was an observational study done over a period of 12 months from January 2013 through December 2013. 50 patients having CVD and symptoms of dry eye were evaluated by slit lamp examination, Schirmer test, corneal fluorescein staining and tear film breakup time after thorough history taking and recording of complaints related to dry eye. Laboratory workup for CVD was also done. Patients were assessed for the grade of dry eye. Out of 50 patients studied, 10 patients had evaporative type, 8 had hyposecretory type and 32 had mixed type of dry eye. 24 patients had mild, 16 patients had moderate and 10 patients had severe type of dry eye. Dry eye is a significant problem in CVD with almost all affected patients showing varying grades of the problem. Patients with moderate or severe dry eye have consistent symptoms. Long term follow up is necessary to assess the effectiveness of early interventions.

Key words: Collagen Vascular Disease, Dry Eye, Schirmer Test, Sjogren's Syndrome

Introduction

Collagen Vascular Diseases (CVD) are autoimmune disorders, characterized by chronic inflammatory Infiltration of exocrine glands and systemic immune reactivity. In the eye, the autoimmune process involves not only the lacrimal gland but also the lids and the entire conjunctival surface. Dry eye is a disorder of the tear film which occurs due to reduced tear production or excessive tear evaporation. It causes damage to the interpalpebral ocular surface and is associated with symptoms of ocular discomfort and/or visual symptoms.1 Dry eye is caused by either quantitative or qualitative deficiencies in one or more of the three different layers of the tear film. Improper lubrication causes the eyes to dry up, thus producing symptoms. There are mainly two types of dry eye, namely evaporative and hyposecretory types. A mixed type is also known.

Dry eye disease may develop in CVD such as rheumatoid arthritis and autoimmune connective tissue disorders such as Sjogren's syndrome.2 In these diseases, dry eye can develop due to the involvement of Meibomian glands in the lids causing instability of tear film due to deficiency of lipid layer and excessive tear evaporation leading to an evaporative type of dry eye. It can also be due to involvement of the main lacrimal gland causing decreased production of tears and a hyposecretory type of dry eye. This study was done to find out the type and severity of dry eye in various Collagen Vascular Disorders. Early detection of dry eye and finding out the type and severity can help in planning preventive treatment strategies. Timely intervention can improve the quality of vision as well as quality of life and prevent complications in the eye.

Materials and Methods

This is a descriptive study done in the Department of Ophthalmology over a period of 12 months from January 2013 through December 2013. 50 patients with clinical findings of CVD and dry eye were included for the study after obtaining clearance of the Institutional Ethics committee and getting informed consent. Patients with previous history of ocular or orbital surgeries, active ocular infection or inflammation, those using topical medications and contact lens, lid disorders such as eyelid malposition, neuromuscular disorders affecting blinking such as Bell's palsy and Parkinsonism were excluded from the study.

Complaints were recorded and thorough history was taken from all patients followed by complete ocular examination. The lids were examined for the presence of any anatomic abnormalities that interferes with the normal spread of tear film. Slit lamp bio-microscopy was done and the presence of mucus strands in the tear film and corneal filaments were noted. Lid margins were examined for integrity or thickening. Meibomian orifices were examined for pouting, presence of foamy secretion and plugging.

Tear break up time (TBUT) with fluorescein was done. TBUT was done by staining the conjunctival sac of both eyes with 2% fluorescein strip wetted with saline and then the patient was examined under slit lamp using cobalt blue filter. Patient was asked to blink several times and then stop blinking. The

time taken from the last blink to the appearance of the first dark spot on the cornea was noted. A value of less than 10 sec was taken as abnormal. A value of <5 sec were taken as severe dry eye. Tear film meniscus height and staining pattern of the cornea and bulbar conjunctiva were also noted.

Schirmer test was done, first without local anaesthesia and then with local anaesthesia. Local anaesthetic abolishes the reflex secretion of tears. Proparacaine hydrochloride 0.5% drops was instilled into both eyes. Excess local anesthetic was wiped off with cotton. After 2 minutes, Schirmer test strips were applied to the inferior conjunctival sac at the junction of the lateral 1/3 and medial 2/3. After 5 minutes, the test strips were removed and the amount of wetting was noted.

A value less than 15 mm in Schirmer test and tear breakup time less than 10 sec was taken as dry eye. A tear film meniscus height <1 mm and punctuate epitheliopathy on fluorescein staining of cornea was also taken as dry eye.

According to the Schirmer values obtained and TBUT, dry eye was classified into mild, moderate and severe (Table 1).

Table 1. Classification of Dry Eye

<table>
<thead>
<tr>
<th>Type of Dry Eye</th>
<th>Schirmer test</th>
<th>TBUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>10 to 15mm</td>
<td>8 – 10 secs</td>
</tr>
<tr>
<td>Moderate</td>
<td>5 to 10mm</td>
<td>5 - 8 secs</td>
</tr>
<tr>
<td>Severe</td>
<td>&lt;5mm</td>
<td>&lt;5 secs</td>
</tr>
</tbody>
</table>

An abnormal Schirmer test with anaesthesia, abnormal tear film break up time and an interpalpebral zone of corneal and bulbar conjunctival staining with fluorescein dye was taken as hyposecretory type of dry eye.

A normal Schirmer value with abnormal tear film break up time and staining of inferior cornea and bulbar conjunctiva was taken as evaporative type of dry eye. Routine laboratory workup including Rheumatoid Factor and Anti nuclear antibodies were done.

Patients with all grades of dry eye were given lubricant eye drops, the frequency of which was determined by the symptoms and the severity. They were asked to come for three monthly follow up.

Results

A total of 50 patients were included in the study, of which 38 were females and 12 were males. All patients had CVD and symptoms of dry eye. 26 (52%) of the patients were in the age group 40-50 years, 16 (32%) in 30-40 years and 8 (16%) in 20-30 years. Out of 50 patients studied, 10 patients had evaporative type (20%), 8 had hyposecretory type (16%) and 32 (64%) had mixed type of dry eye. 24 (48%) patients had mild, 16 (32%) had moderate and 10 (20%) had severe type of dry eye.

The analysis of symptoms which the patients described, are given in Table 2. Out of 50 patients, 22 (44%) had foreign body sensation, which was the most common symptom.

Table 2. Distribution of Symptoms of Dry Eye

<table>
<thead>
<tr>
<th>Distribution of symptoms</th>
<th>Number of patients</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign Body Sensation</td>
<td>22</td>
<td>44</td>
</tr>
<tr>
<td>Ocular pain</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Dryness</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Itching</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Burning Sensation</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

Discussion

All patients with CVD and symptoms of dry eye in this study were confirmed to have features of dry eye on ocular examination. This study shows that 52% of patients with CVD have either moderate or severe dry eye. This shows the importance of looking for dry eye in CVD. It may be argued that a considerable number of patients were in the age group 40-50 years and that Dry eye is common with aging. However, it is to be noted that Severe type of Dry eye was also noticed in the below 40 age group. In this study, patients above 50 years were not seen, probably because of the exclusion criteria.

In this study, 60% patients had Rheumatoid arthritis (RA), 24% had Systemic Lupus Erythematosis (SLE) and 16% had Sjogrens syndrome.

Autoimmune diseases causing dry eye can be classified into four categories. The first type preferentially affects glands as in primary Sjogren’s syndrome and the second affects the exocrine glands and connective tissue as in rheumatoid arthritis and SLE. The third variety is that which affects the ectodermal and mesodermal tissues and cause secondary destruction of glands as in Steven Johnson syndrome. Lastly there is a type which affects other tissues and causes secondary destruction of exocrine glands.

Knowledge of the pathophysiology of dry eye has recently improved and the condition is now understood to be a multifactorial disease, characterized by inflammation of the ocular surface and reduction in tear production. This awareness has led to the development of highly effective therapies.

Studies performed on the proteomic profile of the ocular surface comparing dry with normal eyes using enzyme-linked immunosorbert assay (ELISA) has revealed a decrease in lactoferrin and epidermal growth factor in dry eyes. A protein found in acinar cells of the lacrimal gland, AQP-5, was shown to be increased in the Sjogren type of dry eye syndrome, indicating possible leakage of such proteins into the tear film due to lymphocytic infiltration of the lacrimal gland. It has been reported that there is an increase in inflammatory cytokines, interleukin 1 (IL-1) alpha and IL-1 beta in both meibomian gland dysfunction and Sjogren syndrome, indi-

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cating increased protease activity on the ocular surface, mainly in the conjunctival epithelium.4

Fujita and colleagues in their prospective case control study, investigated the correlation between dry eye and RA activity and concluded that dry eye is common in RA patients.5

Study by Gilboe et al in 2001 concluded that there is increased prevalence of ocular dry eye symptoms and decreased tear production in SLE compared to Rheumatoid arthritis.6 Such a comparison could not be done in our study as the number of patients with SLE were considerably less compared to Rheumatoid arthritis.

In a study by Wangkaew S et al in 2006, it was noticed that dry eye symptoms were significantly common in Thai patients with connective tissue diseases, but the symptoms did not show a good correlation with the clinical and lab variables.7

In a study by Haga HJ et al in 2012, they concluded that around 28% of their patients studied had at least one symptom of dryness.8

Kosirukvorge P et al in a study in 2012 concluded that awareness and detection of dry eye syndrome in Rheumatoid arthritis was crucial for evaluation of severity and proper management.9 Our study could detect 48% mild dry eye patients, thus emphasizing the need for a comprehensive eye evaluation to pick up even mild disease early enough and follow them up.

T Uhig et al in their study reported dry eye symptoms in 38% and reduced tear production in 29% of patients with Rheumatoid arthritis. In our study, it was noted that 64% had mixed type of dry eye and decreased tear production was noted in only 16% of those with dry eye symptoms, among all types of CVD put together.

Artificial tears and lubricants are the mainstay in the treatment of dry eye. Artificial tears replenish the deficient aqueous layer of the tear film and dilute inflammatory cytokines. Artificial tears are available in different viscosities and as preservative free preparations. If the tear deficiency is severe, more viscous agents such as gels or ointments can be used to maintain longer protection. In Sjogren syndrome, which is associated with inflammation, the use of topical steroids and non-steroidal anti-inflammatory medications is sometimes helpful. In the present scenario there are treatment modalities like immune-modulators which are specific to the etiology and severity of dry eye. Studies have demonstrated an improvement in signs and symptoms of dry eye, together with reduction in conjunctival T-cell infiltration and tear cytokine levels following the use of cyclosporine-A drops.10,11

Our study showed that a mixed form of dry eye disease is common in CVD patients, thereby rendering them unresponsive to various treatment modalities.

There are reports of the use of autologous serum as topical eye drops for severe dry eye with improvement reported after prolonged treatment regimens ranging from 4 to 6 weeks.12 Surgical approaches are also available like mechanical occlusion of the lacrimal puncta for blocking tear drainage and thereby prolonging the action of natural tears. Along with the local treatment for dry eye, the systemic disease should also be under control.

In very severe dry eye secondary to ocular surface disease (such as chemical injury, Stevens-Johnson syndrome, or ocular cicatricial pemphigoid), amniotic membrane transplantation, tarsorrhaphy, keratoplasty, limbal stem cell transplantation, or even ocular prostheses, such as rigid scleral contact lenses, may become necessary for restoration of vision.13

One of the limitations of this study is inadequate sample size. This was because only those CVD patients with symptoms of dry eye could be included in the study and the fact that CVD is not a very common disease. We could also not ascertain the overall prevalence of dry eye in CVD because of the same reason. Nevertheless, the study throws light on the severity of Dry eye disease in CVD and hence the necessity to initiate early intervention.

**Conclusion**

Dry eye disease is a significant problem in CVD patients. Ocular examination of CVD patients can pick up even mild disease early enough for intervention. Long term follow up is necessary to examine the effectiveness of early ocular interventions in preventing complications.

**End Note**

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**Conflict of Interest:** None Declared

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