JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

REVIEW ON DIAGNOSTIC ASSESSMENT OF DRY EYE SYNDROME'S CLINICAL TEST

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Abstract:-

Patients with Dry Eye can present to clinicians in a variety of ways. Typical Dry Eye patients complain of eye irritation; however, some patients complain of blurred or fluctuating vision, and occasionally, patients with severe Dry Eye have no complaints.

Schirmer's 1 and 2 tests should not be used as the sole basis for the diagnosis of keratoconjunctivitis sicca.

♦Fluorescein staining assesses the integrity of the ocular surface epithelial barrier function.

♦Rose bengal staining indicates a lack of the protective ocular mucins.

♦Lissamine green is a vital dye that stains dead and degenerating cells.

The diagnosis of dry eye disease is not made based solely on patient history, clinical examination and clinical testing. All three are necessary to determine the presence, etiology, and severity of dry eye.

Historically, the tests used to diagnosis dry eye assumed that a dry eye was dry, that there was insufficient tear production. Thus, tests of tear secretion, Schirmer's 1 and 2 tests, basal tear secretion, cotton thread test, fluoresce in dilution, tear film osmolarity, tear turnover, and tear clearance were used and were important in the diagnosis of the dry eye. It was also recognized that ocular surface disease often accompanied the dry eye. Fluorescein, rose bengal and lissamine green dyes and impression cytology were used to assess the degree and severity of conjunctival and corneal involvement. Unfortunately, there seemed to be minimal if any correlation between symptoms and any of these clinical tests. In fact, there was generally no correlation between any of the tests.

Keywords:- Dry Eye Syndrome, Clinical Test, Diagnostic Assessment.

Introduction:-

A key aspect of DE that remains a major problem is the lack of association between the symptoms and signs and the poor test reproducibility of objective tests, making it difficult to assess disease progression or the impact of treatments on symptoms.

There are many subjective and objective methods to test for dry eye. In this chapter, contemporary dry eye tests are discussed, to aid clinicians in the diagnosis of dry eye.When clinicians attempt to classify patients with signs and symptoms of dry eye, a wide battery of tests are available. Of these, a careful patient history and the use of dry eye questionnaires have been shown to be very useful in the diagnosis of dry eye.

Dry Eye Syndrome's Test:-

A. Assessment of Corneal / Conjunctival Sensitivity

The first corneal esthesiometers measured corneal sensitivity using the pressure exerted by a pig hair deflected against the corneal surface**50**. Technical problems included effects of hair size and humidity on the measurement.These were solved with the Cochet- Bonnet esthesiometer, which uses a monofilament nylon thread that is extendable from 0 to 60 mm.

Dry eye patients examined with the Cochet-Bonnet esthesiometer had reduced sensitivity compared with normal subjects, which correlated strongly with delayed tear fluorescein clearance. This reduction in corneal sensation was hypothesized to disrupt the integrated lacrimal function unit and may be coadjuvant in the pathogenesis of Dry eye syndrome.

B. Assessment of lacrimal gland function:-

I. Invasive tests for tear volume

- Schirmer's I test:

One of the earliest tests for estimating tear volume was devised by Schirmer (1903).

This is a strip of thin filter paper (35 mm long, 5 mm wide) which is hooked over the lower eyelid. The hook is 5 mm long with a rounded edge. On contact with the ocular surface the paper absorbs tears. The length of paper wetted over a set time of 5 minutes is an indication of tear volume. The paper can irritate the ocular surface initiating a reflex action whereby the volume of tears secreted by the lacrimal glands increases. Thus, the Schirmer's I test is measuring both a basal and reflex tearing. The Schirmer's I strip comes into suggests that, maybe the lid margins should also be anesthetized if the aim is to measure basal tear secretion. Many investigators conclude that the Schirmer's I test measures the flow of tears rather than volume and the fact that it irritates the ocular surface is a useful adjunct. If the Schirmer's I score is still low after irritating the ocular surface then clearly we have a very dry, as opposed to a marginally dry, eye. Low Schirmer's I test results are encountered when corneal sensitivity is reduced in severe dry eyes.

Schirmer's I test results are low after refractive surgery presumably because corneal sensitivity has been reduced[1,2]. A dry–normal cut-off value of 5 mm of wetting in 5 minutes has been used for many years but this is not reliable because 17% of normal eyes have a Schirmer's I wetting of less than 5mm91 and 32% of dry

eyes have a Schirmer's I wetting of greater than 5mm. The true value of the Schirmer's I test in the modern setting is questionable, even though it is still one of the most popular tests used by clinicians.

- **Cotton thread test:**

The cotton thread test has been used in the assessment of lacrimal secretion. A crimped end of a piece of phenol red–impregnated fine cotton thread is placed between the eyelid and globe. Cotton can soak up tear fluid by capillary action. The cotton thread**63** is dyed with a pH-sensitive phenol red. The amount of wetting is measured after 15 seconds.**64** Normal values are 9 to 18 mm of wetting. This test is probably measures tear volume and not tear flow. Cotton thread test values do not correlate with Schirmer's 1 and 2 test values.

II. Tear film stability and break up:

The tear film is reformed by the actions of the eyelids upon blinking, approximately every 3–6 seconds. If the eye is kept open following a blink, the tear film can be seen to rupture, exposing dry spots of uncovered epithelium.

- **Invasive Tear Break Up Time (TBUT, fluorescein break up time)**

Apply one drop of 0.5 % fluorescein dye to the conjunctival fornix of each eye. Ask patient to blink strongly to squeeze out the excess dye. Wait 2 min for the fluorescein to diffuse and stain the pre-corneal tear film and tear meniscus. Ask the patient to blink once and hold their eyes open. The TFBUT is the number of seconds between the patient's last blink and the first appearance of a random dry spot on the cornea. Three consecutive readings should be taken for each eye and the mean value recorded. This test requires observing the cornea using a slit lamp bio-microscope, with a broad beam cobalt-blue light source set at, say, 10X magnification to view the tear film[3].

- **Non-invasive tests of tear film stability:**

Non-invasive assessment of tear stability was first mooted in the 1980s. The first device for non-invasive measurement of tear film stability was presented by Mengher *et al.* (1985)[4] This consisted of a large hemispherical bowl featuring thin white illuminated parallel criss-cross lines on a dark background. The subject is seated, the bowl is arranged to reflect the lines off the cornea and the reflection is observed using a microscope. Other techniques based on the same optical principles are the keratometer mire[5] tear scope and topographic analysis systems including video-keratoscopy, ocular surface thermography, lateral shearing interferometry.

C. Tear Film Osmolarity

Hyperosmolarity is a contributing mechanism in ocular surface damage and inflammation associated with aqueous tear deficiency and meibomian gland dysfunction. It was recognized by the NEI/Industry workshop on dry eye as a global measure of tear film deficiency. Collection of microliter tear sample volumes with small diameter glass pipettes allows measurement of osmolarity without causing reflex tearing. However in the absence of a simple clinical technique to measure tear osmolarity, this diagnosis test will remain a research tool for the present.

D. Measurement of Tear Clearance

Includes Schirmer's, Phenol red threat tear test (PRT). Tear fluorescein clearance can be assessed visually in the inferior tear meniscus, on Schirmer's I strips. Schirmer's I strip method for tear clearance evaluation The color of the fluorescein on the Schirmer's I strip is compared visually with known concentrations of fluorescein Delayed clearance (turnover) of fluorescein dye instilled onto the ocular surface has been reported for Aquous tear deficiency and meibomian gland disease which are the two most commonly encountered dry eye conditions. PRT test has been described as a a measure of tear volume and turn over. Evaluation is made by measuring the quantity of tears absorbed in a fine cotton thread placed in the inferior cul-de sac. Normal value of 24mm in 15 seconds, if it is less than 11mm in 15 seconds is diagnostic of aqueous tear deficiency. Flurophotometry can be evaluate tear flow and tear volume by measuring the decay of sodium fluorescein in the tear film after topical application. Tear turnover rate is 42% lower in dry eye subject than in normal.

E. Assessment of Meibomian Gland Disease

Meibomian gland disease is considered to be the major cause of evaporative dry eye .
It is due to Atrophy of the glandular acini, Obstruction of the duct by epithelial hyperplasia.[6]

With the help of Slit lamp examination we diagnose Lid abnormalities and Ductal orifice metaplasia. While Meibomian gland acinar dropout in chronic blepharitis has been imaged using an infrared video camera and hand-held trans-illuminating light source.[7]

F. Evaluation of Conjunctival Mucin Production

The stratified epithelial Goblet cells, Crypts of Henle, and Glands of Manz in the conjunctiva produce mucins. Deficiency of mucin in the tear film results and the tear film becomes unstable.

Superficial cells may be obtained from the bulbar conjunctiva by application of a cytology membrane against the conjunctival surface (impression cytology), allowing quantitative measurement of goblet cells and a qualitative assessment of the epithelial morphology in various conjunctival diseases. Adequate samples of conjunctival cells may also be collected with a brush.[8] The extent and severity of squamous metaplasia are graded by loss of goblet cells,enlargement and increased cytoplasmic/nuclear ratio of superficial epithelial cells and keratinization.

G. Diagnostic Dye Staining

Fluorescein, Rose bengal and lissamine green dyes are the simplest and most practical method of assessing the severity of dry eye syndrome. Fluorescein penetrates areas of the corneal epithelium and conjunctival epithelium where intercellular junctions are disrupted (usually first observed nasally),while rose Bengal stains damaged areas in which the tear film itself is discontinuous. Fluorescein strips should be wetted with a standardized volume of non preserved saline and the corneal staining observed after 2 min through a yellow filter. Lissamine green has been proposed as an altrnative dye for staining. Studies have demonstrated that rose bengal and lissamine green exhibit similar staining patterns in individuals with dry eye, though lissamine green is less irritating upon instillation.

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