A POPULATION STUDY OF MICROCYSTIC CORNEAL EPITHELIAL CHANGES

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Microcystic changes of the corneal epithelium have commonly been described as a dystrophy; a developmental, frequently hereditary, bilateral change affecting primarily one layer of corneal tissue that is usually progressive and appears in relatively young people.[1] These changes were described as map, dot, fingerprint, mare's tail, and bleb due to their biomicroscopic appearance.[2] Microcystic changes of the epithelium have commonly been associated with recurrent epithelial erosions. Brown and Bron[3] found in their study that 59% of the patients with recurrent epithelial erosions had signs of microcystic corneal epithelial changes. Microcystic changes are caused by the production of an abnormal corneal epithelial basement membrane.[4] The prevalence of microcystic dystrophy has been said to be anywhere from .025% by Guerry[5] to 6% by Laibson[6]. Werblin, et al,[7] in 1981, found these microcystic changes in 42% of the general public with no difference in percentage with this group and with a genetic populationoof subjects(and their relatives) who suffered from recurrent epithelial erosions and had microcystic epithelial changes. They also found that the prevalence of microcystic changes showed a dramatic increase with age, 76% of persons over age 50 showed these changes. Their study was done over a four year period and raises the possibility that microcystic changes might be an age dependent degenerative condition of the corneal epithelium rather than a dystrophy.

The purpose of this study is to do a population study to determine the prevalence of microcystic changes in a general clinical population. It will also compare biomicroscopic examination techniques that do not require a dilated pupil with the technique used by Werblin, et al,[8] in which all patients were dilated. This study compared retroillumination off of the iris and the tear break-up time test to find the microcystic changes. The basement membrane of the epithelium is abnormal and there is localized thickening of the epithelium in corneas with microcystic changes. Due to this the fluroscein should run off of the affected areas of the cornea. This should produce a rapid symmetrical break-up time (1-2 seconds), which is repeatable.

METHODS

The following procedures were performed on patients seen by me in the summer and fall rotations of my senior year. The clinical locations were the State Prison of Southern Michigan and the Ferris State College Optometry Clinic.

Werblin, et al,[9] examined all of their subjects using retroillumination off of the retina through a dilated pupil with a biomicroscope using 25X magnification. For this study, subjects were examined, undilated, using direct illumination to grossly observe the cornea. The epithelium was then studied using retroillumination from the iris. A fluorescein strip was used to

instill the dye in the eye. A tear break up time test was performed and then repeated. At this time patients were dilated using 1% tropicamide(Mydriacyl) if the patients would allow us to dilate and there were no contraindications. The epithelium was reexamined using retroillumination off of the retina.

Each patient was questioned about trauma to the eye and head, and about the occurrence of recurrent epithelial erosion symptoms(pain and tearing upon waking, etc.). Patients with a history of trauma to the eye were not included in the study due to disruption of the epithelial basement membrane from trauma leaving scars and changes which could be confused with microcystic changes.

RESULTS

A total of 148 subjects were examined for evidence of microcystic changes. Fifty-eight of these were disqualified due to trauma to the eye(a majority of those disqualified were at the State Prison of Southern Michigan). Two of the disqualified subjects had recurrent epithelial erosion symptoms. Of the 90 subjects, 55 were male and 35 were female. A total of 23 subjects were found to have microcystic changes. A majority of the microcystic changes were in the central two-thirds of the cornea with no difference in occurrence between the superior and inferior halves of the cornea. The "map" type was the most common form of microcystic change(see Figure 1). The percentage of microcystic changes ranged from 13% in the 21-40 age group to 52.8%

in the over 70 age group(see Graphs 1,2,&3). Two of the subjects with microcystic changes also had recurrent epithelial erosion symptoms.

A tear break up time test was performed on twelve of the 23 subjects who had microcystic changes. Nine of these subjects(75%) had an instantaneous break up time which was symmetric around the area of the microcystic change.

Thirty-seven of the subjects were dilated. Of the 37, twelve had microcystic changes. All twelve of the subjects were found to have the microcystic changes using iris retroillumination before their pupils were dilated.

DISCUSSION

The occurrence of epithelial basement membrane microcystic changes in this study was found to be age related. This is more a tendency of a degeneration than of a dystrophy. Degenerations have no definite underlying cause, tend to develop later in life, and have no early effect on vision.[10] The recurrent epithelial erosion symptoms were found in only two people with microcystic changes. In one of these, the microcystic changes were bilateral, quite extensive, and the subject was age 36. Can this mean that there are two separate forms of microcystic basement membrane changes, one a dystrophy and one a degeneration? If so, are the microcystic changes caused by the dystrophy more extensive, closer related to changes causing recurrent epithelial erosions, and

do they account for most of the changes that occur in younger people?

This study did not find microcystic changes in as high of a percentage as Werblin, et al,[11] (42%), but it did find a significantly larger percentage(25.5%) than other investigators had found(6%). One possible explaination for this study finding a smaller percentage than Werblin, et al,[12] is that only 41% of our subjects were dilated. Dilation was stressed by Werblin, et al,[13] as being necessary to find all of the microcystic changes present in a cornea. The fact that microcystic changes were seen before dilation in all twelve dilated subjects with microcystic changes disputes this. Subjectively, it was much easier to see the microcystic changes with a dilated pupil. Microcystic changes were easy to miss in a routine slit lamp examination of an undilated subject. A very thorough examination was necessary.

The tear break up time test was found to be instantaneous and symmetric around the microcystic area in 75% of the cases where the subject had microcystic changes. In many cases the area of the break up was very small. Since microcystic changes have a varying effect on contact lens wearers(both hard and soft), this can have some clinical significance.[14] Patients with microcystic changes should be told before fitting with contact lenses that they have a <u>possibility</u> of developing recurrent epithelial erosions and mild foreign body discomfort. These patients tend to have a very rapid tear break up time and this makes them

more susceptible to mechanical irritation secondary to contact lens wear. Microcystic changes alone should not rule out the possibility of contact lens wear. McMonnies[15] found that some patients have no symptoms with contact lens wear. The microcystic changes should be noted, the patient told of the possible consequences of contact lens wear, and a joint decision made on contact lens wear.

With more and more aphakic patients wearing contact lenses and bifocal contact lenses becoming more popular, microcystic changes can become more of a problem since these changes are found in a higher percentage in older patients. More and more information will be found as to the relationship between microcystic changes and the occurrence of recurrent epithelial erosions in contact lens wearers as the number of older contact lens wearers increases.

CONCLUSION

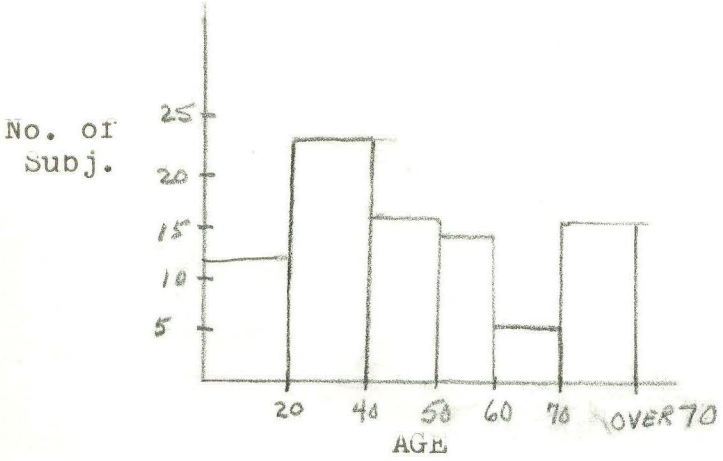
Corneal epithelial microcystic changes were found in a higher percentage of patients than most previous studies reported, and the occurrence of these opacities increases as the age of the patient increases. Tear break up time testing can aid in diagnosing the presence of microcystic changes, but cannot diagnose it solely and does not always show a rapid, symmetric break up when microcystic changes are present. A thorough slit lamp examination using retroillumination must be performed to accurately diagnose microcystic changes. The clinical significance

of microcystic changes in the contact lens wearer and the occurrence of recurrent epithelial erosions in patients with microcystic changes is still questionable. Contact lens patients with microcystic changes should be informed of the possibility of developing recurrent epithelial erosions before fitting, and should be closely followed. Also, patients who are having minor foreign body symptoms and symmetric corneal staining should be examined closely for any microcystic changes that could possibly induce these signs and/or symptoms.

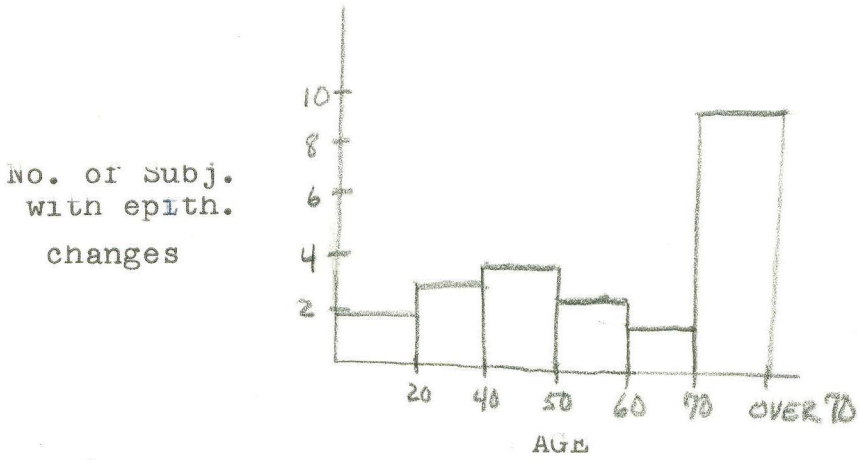
Figure 1

Type of Microcystic Change	Number
Map	18
Dot	5(3 in combination with Map)
Mare's Tail	2(1 in combination with Map)
Fingerprint	3(1 in combination with Map)
Blob	1(in combination with Map)

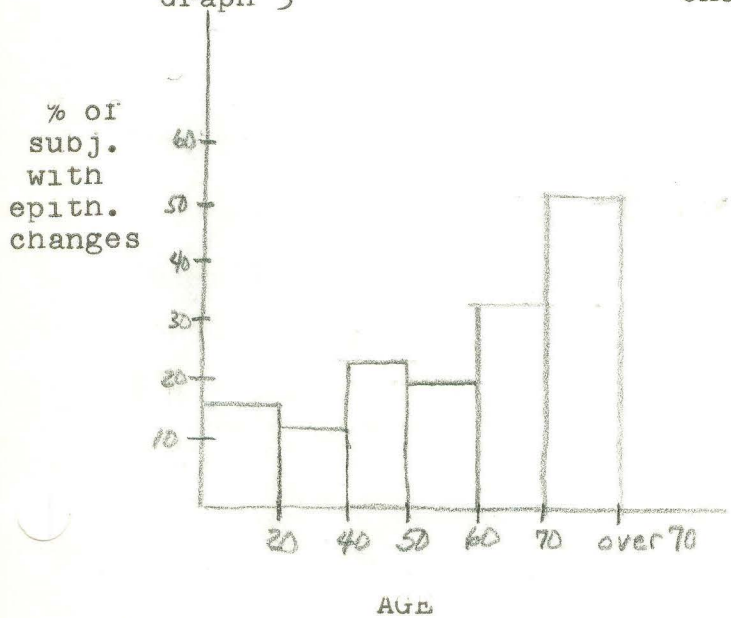
Graph 1



Graph 2



Graph 3



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