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A Study on Amsler's Grid in Acquired Macular Disorders

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

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ABSTRACT

Aim: Prospective study on the Amsler Grid pattern of patients with various acquired macular disorders during the period of 3 months between Jan 2016 to March 2016.
Materials and Methods: Fifty seven eyes patients who attended the Retina clinic at tertiary eye hospital between Jan to March 2016 after satisfying the inclusion criteria. All patients underwent routine eye examination including visual acuity, slit lamp examination, 90D and indirect ophthalmoscopy and amsler grid.
Results: The mean age was 46.8 years. The maximum number of patients were in the 50-60 years group; 37 males and 13 females. Twenty two patients had central serous retinopathy, 24 patients had clinically significant macular oedema, 6 patients had age related macular degeneration, 4 patients had cystoid macular oedema and 1 had macular hole. The most common complaints of the patients during presentation were scotoma i.e. 24 patients presented with central scotoma, 4 patients presented with metamorphopsia, 14 patients presented with micropsia, 4 patients presented with macropsia and 12 patients presented with distortion of whole chart.
Summary: The amsler's grid proved to be a useful tool to identify some of the macular diseases with subjective symptoms and a relatively normal visual acuity. An early diagnosis means early

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treatment, so it may help to limit or at least slow the vision loss. It is also a useful tool to follow up patients concurrently with treatment to see the subjective improvement in the visual disturbance.

Keywords: Amsler grid; central serous retinopathy; macular edema; macular degeneration.

1. INTRODUCTION

There are numerous tests available to assess the subjective symptoms of a patient. Amongst all of them Amsler Grid is a very unique and fascinating test in which the patient can express the kind of visual distortion.

Amsler Grid (am-SLUR) is a test card, graph paper like grid used for qualitative vision evaluation of the central 20 degree of vision (10 on each side of fixation).The Amsler's grid is a type of visual field testing.

It is also a simple screening test used to assess the macula (the centre of the retina).

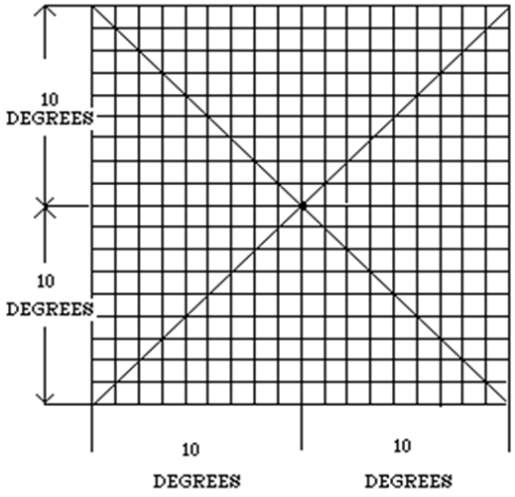

Fig. 1. Amsler grid

The Amsler's grid should be performed when a patients present with chief complaints of distorted or strange visual symptoms or with a decreased visual acuity that does not improve with pinhole.

The test may be used diagnostically to discover the presence and or location of defects in the central field of vision. The test is also frequently given to patients to use at home to monitor macular degeneration.

Amsler's grid is used to detect these central vision defects or distortions. The cause of this type of defect or distortion is usually a result of macular dysfunction such as macular degeneration or other conditions like Central serous retinopathy, Cystoid macular edema etc.

The Amsler's grid testing evaluates the 10% of the visual field surrounding fixation and is useful for both screening and monitoring macular disease [1,2].

1.1 Amsler Grid Testing

The Amsler's grid should be held by the patient at normal reading distance of 28-30 cm utilizing the correct refraction for this distance. Viewing should be accomplished without previous ophthalmoscopy and without instillation of any drugs affecting pupillary size or accommodation [3,4]. The patients should be using their best correction for near. The test is performed with one eye at a time. The patient is asked to look at the dot in the centre of the grid. The purpose is to see if the patient notes any abnormalities in the grid while focusing on the central dot. The patients should see all the lines straight and parallel with no broken, wavy, distorted, or missing areas [4,5,6].

1.2 Inference

1) Absence of the spot may indicate the presence of a central scotoma.
2) The inability to perceive these areas may indicate the presence of an arcuate scotoma of glaucoma encroaching upon the central area or a centrocecal scotoma.
3) If an area of the grid is not visible then a para central scotoma is present.
4) If not then metamorphopsia is present. The parallel lines may "bend" inwards giving rise to micropsia or "bend" outwards giving rise to macropsia.
5) If any blur or distortion in the grid, or any movement or colour aberration, these changes may be present prior to the appearance of a definite scotoma.

Amsler's grid is a good way to detect early stages of some macular diseases such as,

1. Age related macular degeneration
2. Central serous retinopathy
3. Clinically significant macular oedema
4. Cystoid macular oedema
5. Macular hole

1.3 Abnormalities of Amsler Grid

The first grid has white lines on a black back ground and central white dot on which the patient is to fixate. If the patient reports on the first chart that they cannot see the central white spot. This would indicate a positive scotoma. The following chart should be used on which diagonal lines help to maintain central fixation. This helps them to point out the limits of the scotoma. This chart also has white lines on a black back ground and central white fixation dot [7-10].

The third chart has red lines on a black back ground and is very helpful in diagnosis of optic nerve, chiasmal, or toxic amblyopia related problems [10].

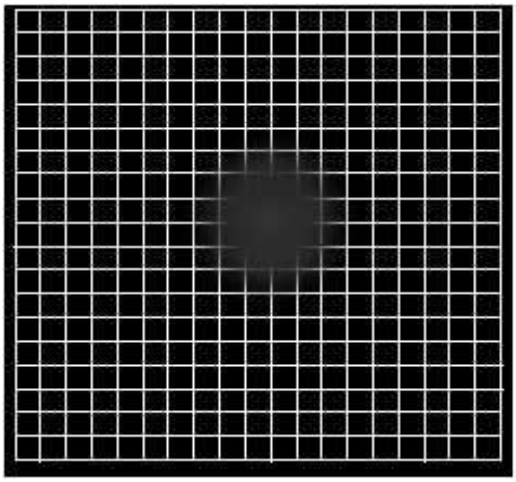

Fig. 2. Central scotoma

Central scotoma as seen by a patient with a positive or absolute scotoma.

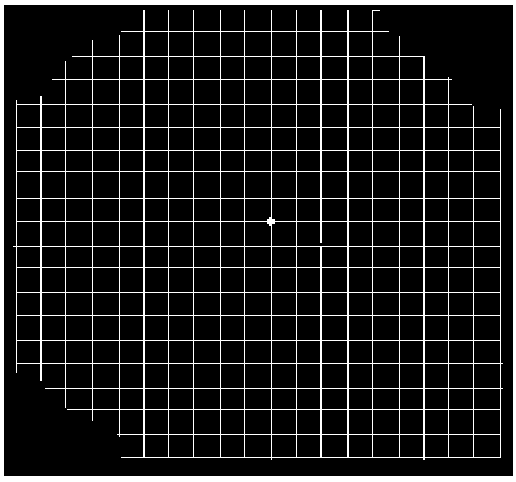

Fig. 3. Arcuate scotoma

Above chart is an arcuate scotoma as seen by an advanced glaucoma patient.

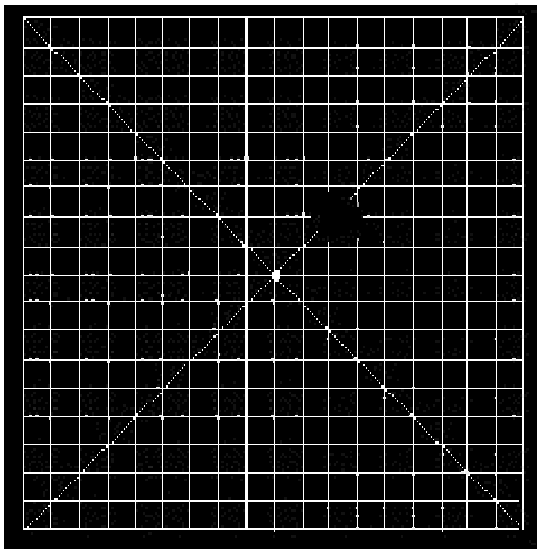

Fig. 4. Paracentral scotoma

Above chart is a positive or absolute Para central scotoma as seen by the patient that might be the result of a healed chorioretinal scar.

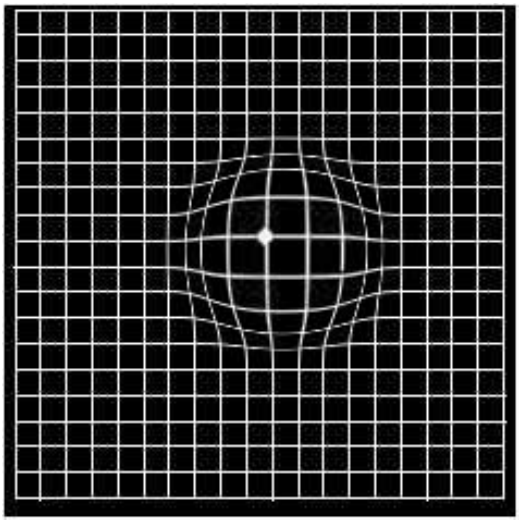

Fig. 5. Macropsia

A space-taking pathology such as a tumor that forces the cones closer together will cause the grid to be seen distorted. The retinal image will fall on more cones than normal and the lines of the amsler grid will be seen as larger and bend outward as in the above. This is known as "macropsia".

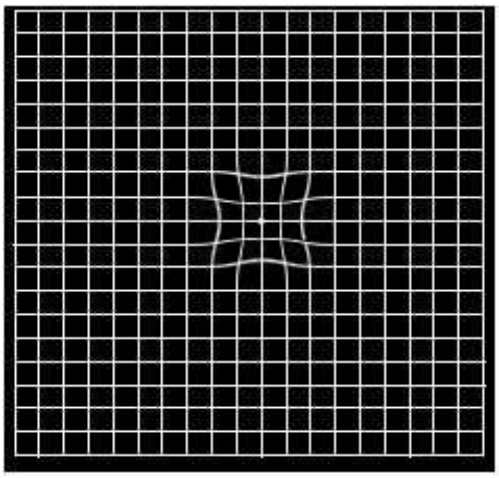

Fig. 6. Micropsia

A patient with macular edema or any other pathology that forces the cones apart .The retinal image will stimulate fewer cones than normal and the lines of the amsler grid will be seen as smaller and tend to bend away from the patient. This condition is termed "micropsia".

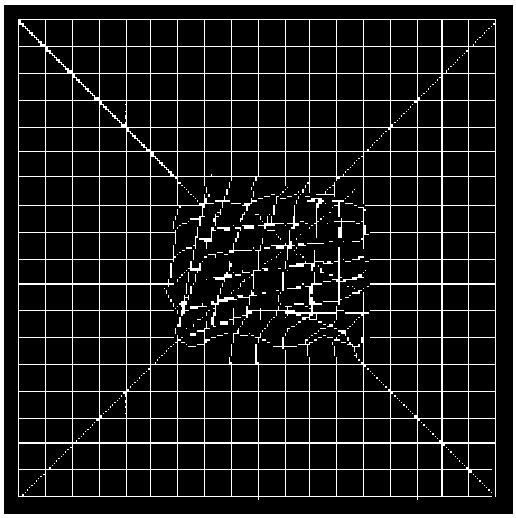

Fig. 7. Metamorphopsia

This condition is termed metamorphopsia. A combination of squeezing and spreading of the cones causes an overall distortion of the image. The lines of the amsler grid become distorted and non-uniform. This can occur in a number of macular and retinal conditions [11-15,16-21].

1.4 Aim of the Study

To conduct a prospective study on the Amsler Grid pattern of all patients with various acquired macular disorders who have attended the retina clinic of tertiary eye hospital during the period of 3 months between Jan 2016 to March 2016.

2. MATERIALS AND METHODS

This is a prospective non comparative study of 57 eyes of 50 patients who attended the Retina clinic at tertiary eye hospital between Jan to March 2016. All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this paper and accompanying images'.

2.1 Ethical Approval

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

Following examination has been done:

1. All the patients were subjected to a detailed clinical fundus examination with 90D.
2. All patients were subjected to fundus photography.
3. All patients with Central serous retinopathy, Clinically significant macular oedema, Age related macular degenerations were subjected to fundus fluorescein angiography.
4. All patients with Central serous retinopathy, Macular oedema and Macular hole were subjected to Optical coherence tomography.
5. All the patients were subjected to Amsler grid testing using the following protocol.

2.1.1 Inclusion criteria

1. All cases of Central serous retinopathy, age related macular degeneration, cystoids macular oedema, clinically significant macular oedema and macular hole diseases with a minimal visual acuity of 1/2/60 and near vision with N24 were taken up for the study.

2.1.2 Exclusion criteria

1. Patients who were not cooperative for Amsler's grid testing.
2. Uncontrolled diabetes and hypertension.

Testing was done with adequate lighting. Subjects were asked to wear their reading glasses or the best corrected glasses for near vision were given. Subjects were asked to hold the Amsler grid at normal reading distance (about 30 cms).

3. RESULTS

In this prospective, non comparative study, 57 eyes of 50 patients with Central serous retinopathy, Age related macular degeneration, cystoid macular edema, clinically significant macular edema and macular hole who presented at the tertiary eye hospital between January to March 2016.

The risk factors found in this study with 2 patients who were pregnant, 15 patients with uncontrolled diabetes and hypertension, 5 patients were smokers and alcohol addicts and 7 patients with history of having injuries.

The results of the study are analysed as follows.

3.1 Age and Gender Distribution

Majority of patients belonged to the 50 – 60 years of age group. The mean age was 46.8 years.; i.e. 7 patients in the 20 -30 years group; 9 patients in the 31-40 years group;10 patients in the 41-50 years group;16 patients in the 51-60 years group and 8 patients in the 61-70 years age group. Out of these, 37 were males and 13 females.

3.2 Macular Diseases

Twenty two patients had Central serous retinopathy, 24 patients had Clinically significant macular oedema, 6 patients had Age related macular degeneration, 4 patients had Cystoid macular oedema and 1 had Macular hole.

3.3 Amsler's Grid Pattern at the Time of Diagnosis

The most common complaints of the patients during presentation were scotoma i.e. 24 patients presented with central scotoma, 4 patients presented with metamorphopsia, 14 patients presented with micropsia, 4 patients presented with macropsia and 12 patients presented with distortion of whole chart.

3.3.1 Central serous retinopathy (CSR)

In Central serous retinopathy 11 patients presented with central scotoma, 7 patients presented with micropsia, 1 patients presented with metamorphopsia and 3 patients with wavy appearance.

3.3.2 Clinically significant macular edema (CSME)

In Clinically significant macular edema 6 patients presented with central scotoma, 6 patients presented with micropsia, 3 patients presented with metamorphopsia 2 patients with wavy appearance, 6 patients had distortion of whole chart and 1 patients with macropsia.

3.3.3 Age related macular degeneration (ARMD)

In Age related macular degeneration 4 patients presented with central scotoma, 2 patients presented with micropsia and 6 patients had distortion of whole chart.

3.3.4 Cystoid macular edema (CME)

In Cystoid macular oedema 2 patients presented with central scotoma and 2 patients presented with macropsia.

4. DISCUSSION

In this study entitled "A study on Amsler's Grid in Acquired macular disorders", amsler's grid was used in 50 patients. In our study majority of patients belonged to the 50 – 60 years of age group. The mean age was 46.8 years.; i.e. 7 patients in the 20 -30 years group; 9 patients in the 31-40 years group; 10 patients in the 41-50 years group; 16 patients in the 51-60 years group and 8 patients in the 61-70 years age group. Out of these, 37 were males and 13 females, males were represented more frequently than females i.e 3:1. The risk factors found in our study were patients with uncontrolled diabetes, hypertension and systemic corticosteroid therapy which were similar to the study by Robert Haimovici and associates. But risk factors were less as compared to other sudies. Self study at home with an Amsler grid might also be sufficient to facilitate early detection of Age related macular degeneration. The use of Amsler grid for monitoring the central visual field for the appearance of new scotomas and metamorphopsia has been recommended for

Age related macular degeneration (AMD) patients, studies have demonstrated that the sensitivity for detecting Age related macular degeneration lesions may be low.

Amsler grid may be sufficient for diagnosis in patients whose presentation is classic.

Search of available literature from the reference books, internet did not reveal any authenticated study to clearly demonstrate various pattern of Amsler's grid in the mentioned macular disorders [17-21]. This study shows various patterns of Amsler Grid abnormalities in the five diseases covered.

5. SUMMARY

In this prospective, non- comparative study, 57 eyes of 50 patients with acquired macular disorder like Central serous retinopathy, Age related macular degeneration, cystoid macular edema, clinically significant macular edema and macular hole were included. Amsler grid was done to all patients at the time of presentation. Patterns of central scotoma, metamorphopsia, macropsia, Micropsia, distortion and wavy appearence were recorded. Most of the patterns correlated well with the type of diseases.

The amsler gridmight also be sufficient to facilitate early detection of Age related macular degeneration. The Amsler's grid proved to be a useful tool to identify some of the macular diseases with subjective symptoms and a relatively normal visual acuity. An early diagnosis means early treatment, so it may help to limit or at least slow the vision loss. It is also a useful tool to follow up patients concurrently with treatment to see the subjective improvement in the visual disturbance.

If the patient is at risk for macular degeneration or other eye diseases, one can use this chart at home to monitor oneself.

Amslers' grid provides a way in which patients are able to regularly home test themselves thus allowing for better follow-up and management of the disease.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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