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MACULAR HOLE IN THE RETINA

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This paper reports 23 cases of so-called hole in the macula discovered in the examination of recruits, many of whom were suspected of malingering. These reports furnish the basis for a statistical study and indicate the frequency of a lesion heretofore supposed to be rare. Authority to publish granted by the Board of Publication, S. G. O.

Among the eye cases referred to the Special Medical Examining Board, U. S. Army, Camp Travis, Texas, during 1917 and 1918, out of 100,000 troops, twenty-three men had a hole in the retina at the macular region. Most of these men were inducted into the service as malingerers or fakers, endeavoring to avoid the draft, if possible, by claiming a dimness of vision in one eye.

The members of the local board, on inspection of the eyes, in cases of this kind find nothing abnormal, except a slightly dilated pupil. It often happens that some member of the board has known the applicant for years without being aware of the fact that the man has one defective eye; therefore the members of the board are perfectly honest in their opinion, and absolutely correct in their action when they induct such a man into the army. Many drafted men claim a dimness of vision in a normal eye to avoid the draft. All local boards have had this trick played upon them, and are to be complimented on not having taken any chances during the last few increments.

A retinal hole at the macular region is seldom seen in the practice of our busiest oculists, and is not frequent in our largest eye clinics. There are many suffering with a retinal hole at the macula, who do not know what is wrong with their weak eye, due to the fact that they have not had it examined by a doctor.

A hole in the retina, when located in the macular region, is a perfect circle as a rule, but is occasionally elliptical.

STATISTICS

Elliptical holes	4
Round holes	19
Light pink choroid	9
Dark pink choroid	14
Pigmented halo around hole	14
White exudate specks	13
White exudate specks, pigmented.	8
White exudate specks, retina	10
Scotoma central	17
Scotoma of half of field	3
Pigmented choroid	12
Rupture choroid	7
Right eye	14
Left eye	9
Colored	13
White	10
Specific history	6
Scintillans	2
Detached retina	1
Dilated pupil	23
Light reaction retarded	23
Accommodation reaction retarded .	23
Power of convergence reduced	23
Squint	1

In this series of cases are nineteen round retinal holes and four elliptical. The elliptical cases have a large retinal hole, the long axis of which is horizontal, as a rule, and if extended would strike the disc.

The small holes are perfectly round, due to the fact that they are contained within that portion of the retina, at the macular region, which is reduced in thickness. The retina increases in thickness from the fovea outward in all directions, offering an equal resistance

to a retinal tear, confining it to this particular area; thus the circular retinal hole.

If the accident is great enough to produce a retinal tear that extends thru the thick retina at the macular area, the retinal hole usually becomes elliptical in shape, following the line of least resistance, which, as a rule, is horizontal. This does not hold true in all cases, however, there being two in this series with large round retinal holes, but it holds true in all the elliptical cases. The fact that an occasional hole in the macular region is large and round may be due to a congenitally large area of thin retina at the macular region.

The color of the exposed choroid in the bottom of a retinal hole, at the macula, varies between a light and dark mottled cherry red, and has no diagnostic value. The cases being equally divided between light and dark. The light choroids are as frequent in the white as the negro, which proves the degree of pigment in the body has nothing to do with the amount of pigment in the choroid, when exposed at the macula thru a hole in the retina.

As a rule, there is a halo of pigment in the retinal hole that varies in density. In some cases the pigment deposit is nothing more than a thin sheen, while in others it is in radiating, crooked streaks, or densely deposited patches. Four cases of this series are entirely free from a deposit of pigment, giving a picture of an arterial retinal embolism, with the exception of many small white exudative specks, seen on the surface of the exposed choroid and the retina around the hole.

The small white exudative specks seen in the most of these cases, are nothing more than the remnants of a hemorrhage that took place, in the retina, at the time of the injury. Exudative white specks are free from pigmented margins in some of the cases. This is due to the fact that in certain cases the injury did not disturb the pigment layer, consequently the deposits are free from pigmented margins. In those cases where the pigmented layer is disturbed by the injury

the exudative white specks have pigmented margins, giving them the appearance of a disseminated choroiditis.

A central scotoma is present in each uncomplicated case, the size of the scotoma and the retinal hole bearing some relation to each other, the largest retinal hole showing the largest central scotoma. Four of these cases are complicated with a rupture of the choroid on the temporal side of the macular retinal hole; the field of vision in each of these cases shows the nasal half dark. The right eye was injured in fourteen cases and the left in nine; while this number is not evenly divided, it is too small to make conclusions.

There is a much higher percentage of retinal holes at the macular region among the colored than the white. In this list of cases are thirteen colored and ten white. The fact that we had five times as many whites as colored, from whom these cases were referred, must not be forgotten, proving the percentage of colored would be much higher, if the troops were equally divided. The higher percentage of retinal holes at the macular region among the colored over the whites, does not necessarily mean that the colored have a weaker retina at the macular region than the whites. True the most of them have syphilis, more than one half the cases in this list admitting a positive specific history, yet there are several things we must consider, before we come to a positive conclusion.

The colored people are careless and take more risks with their eyes than the whites; fist fighting, the throwing of stones, sticks, etc. Most colored soldiers were inducted into the service regardless of their vision; while on the other hand, we are safe in saying that a certain percentage of whites, with a retinal hole, were rejected by their local boards on the strength of reduced vision, or intraocular examination, which reduced the percentage of whites.

Taking into consideration all the facts in these cases, the writer is of the opinion there is very little, if any, difference between the white and the

black race with regard to the percentage of retinal holes in the macular region, provided they were both given the same environment.

Every case in this list has a slightly dilated pupil, reacting slowly to light and accommodation, as well as a retarded power of convergence, which means nothing more than would be expected in any eye condition, with a dimness of vision, due to a central scotoma. The macular area of the retina being absent, prevents the transmission of enough light, centrally, to produce sufficient sympathetic action in the affected eye, to give it an equal pupil. The slow reaction to accommodation, is the result of the reduced central vision, which is also responsible for the slow power of convergence.

It is a remarkable fact that an injury great enough to cause a retinal hole in the macular region, seldom, if ever, causes a fluidity of the vitreous, dislocated lens, traumatic cataract, detached retina, or optic atrophy.

Cases

CASE 1. Private W. J. M. (Col.), Res. Pan Handle, Texas. Ex. Sept. 1, 1918.

History. Was kicked over the left eye by a mule, twelve years ago; prior to the injury could see as well with one eye as the other; both eyes swelled shut following the accident, and could not open the eyelids for one week. The vision in the left eye slowly returned during the first month to its present strength, and has not given pain or trouble except the dullness of vision. Specific history.

Examination. Age 21 years; farmer; single. Vision R. 20/20; L. 20/200. Tension normal; left cornea clear and free from scars; aqueous clear, iris free from adhesions and pigment deposits. Pupil slightly dilated, reacting sluggishly to light and accommodation, power of convergence reduced. Lens normal, vitreous clear and not fluid. At the macular region there is a slightly depressed elliptical area, the long axis of which is equal in length to the diameter of the disc. The position of the ellipse is such, if the axis was extended, it would strike the center of the disc. The exposed

choroid at the bottom of the retinal hole, is a light red raspberry color. The margin of the retinal hole has a sharply cut edge, which is free from pigment. On the surface of the exposed choroid are many small white exudative specks, one millimeter each in diameter, free from pigmented margins, giving the surface a mottled appearance. Around the retinal hole is a thin halo of pigment, one fourth the disc diameter in width. On the pigmented retina are several exudative white specks, two millimeters each in diameter, with distinct pigmented margins. The vessels and disc are normal in color and shape. The choroid is free from rupture and choroiditis. Large central scotoma.

CASE 2. Private W. B. (Col.) Age 28 years; farmer; single. Res. Grand View, Texas. Ex. July 18, 1919.

History. When sixteen years of age, was hit in the left eye with a stone, could see nothing but the light for months. Later the vision slowly returned to its present strength. Before the accident one eye was as good as the other, never consulted a doctor with regard to the eye, which has not given one moment's pain or trouble since the injury.

Examination. Vision R. 20/20; L. 10/200. The left cornea is clear and free from scars; aqueous humor clear. Iris free from adhesions and pigment deposits, pupil semidilated reacting slightly to light and accommodation. Power of convergence reduced, lens normal, vitreous clear and not fluid. At the macular region there is a slightly depressed circular area, with a diameter equal to one-third the diameter of the disc. The exposed area of the choroid at the bottom of the retinal hole is a dark cherry red color. The distinct sharply cut retinal margin is a darker red. The exposed surface of the choroid at the bottom of the retinal hole, has six or eight white exudative dots, one millimeter each in diameter, giving this surface a mottled appearance; between these dots is a slight deposit of pigment. A pigmented area extends over the retina a distance equal to the diameter of the disc, with the retinal hole in its center. Over the pigmented area of the retina, are twenty or thirty white exudative specks, one millimeter each in diameter. The margins of

these specks are pigmented, very dark, giving the appearance of a choroiditis. In the non-fluid vitreous, between the disc and the retinal hole, are many cholesterol crystals. The vessels are normal. The disc is normal in shape and color. No signs of choroidal rupture or choroiditis. Large central scotoma.

CASE 3. Private J. L. H. (Col.) Age 27; farmer; married. Res. Gillsborough, Texas. Ex. July 18, 1918.

History. Hit in the right eye with a baseball nine years ago; prior to injury the vision was as good in one eye as the other, at that time the eye swelled and was very painful, but has not given the slightest trouble since; the vision slowly returned to its present strength. Has not had eye examined by a doctor.

Examination. Vision R. 10/200; L. 20/20. The cornea of the right eye is clear and free from adhesions and pigment deposits. Pupil semidilated reacting slowly to light; accommodation and convergence. Vitreous clear and not fluid. At the macular region there is a slightly depressed circular area of a dark cherry red color, the diameter equaling one-third the diameter of the disc. The distinct sharply cut retinal margin around the retinal hole is not of a darker color. There are no white specks on the surface of the exposed choroid, but there are a number of pigmented areas one half millimeter each in diameter, that give a mottled appearance to the bottom of the retinal hole. A halo of clear retina, two millimeters in width, surrounds the retinal hole, beyond this clear area is a pigmented halo one-half the disc diameter in width. In this pigmented area are many white exudative specks, two and three millimeters each in diameter, the margins of which are very black, giving the appearance of small patches of choroiditis, but are plainly seen resting on the retina. The vessels are normal, disc normal in shape and color; no signs of a rupture in the choroid, or choroiditis. Large central scotoma.

CASE 4. Private M. K., Q. M. C., Camp Travis, Texas; age 29 years; smelter; married; Res. Pittsburg, Kans. Ex. October 4, 1918.

History. Was hit in the right eye with a ball fifteen years ago while play-

ing at school; the eye became painful and was badly swollen for one week. Prior to the accident one eye was as good as the other, but since the injury the sight has remained at its present strength, and the eye gives no trouble other than dimness of vision.

Examination. Vision R. 20/20; L. 20/200. The examination of the left eye shows the cornea clear and free from scars, aqueous humor clear, iris free from adhesions and pigment deposit. Pupil slightly dilated; reacting to light and accommodation slowly. Power of convergence reduced, lens normal. Vitreous clear and not fluid. At the macular region there is a slightly depressed circular area, with a diameter equal to one-third the diameter of the disk; the bottom of the depression is covered with exposed choroid of a light cherry color. The margin of the retinal hole has a sharply cut edge which is not pigmented. There is an absence of pigment on the surface of the exposed choroid, the mottled appearance being due to a number of white exudative specks one millimeter each in diameter. The retina around the retinal hole is entirely free from pigment deposit, but there are a number of white exudative specks two millimeters each in diameter, forming a ring around the retinal hole about three millimeters from the retinal margin. The vessels normal, disc normal in color and shape. No rupture of the choroid or choroiditis. Large central scotoma. See Plate XVIII, No. 4.

CASE 5. Private I. S. (Col.) Age 25 years; farmer; single; specific history; residence Quanah, Texas. Ex. August 22, 1918.

History. Was hit in the right eye with a clod ten years ago, could see as well out of one eye as the other before the injury; for several days following the accident, the eye was badly swollen and the lids could not be opened. For one month had only light perception, but later vision returned to present strength. The eye has not given any trouble other than a dimness of vision, and had not been examined by a doctor prior to entering the army.

Examination. Vision R. 20/200; L. 20/20. Examination of the right eye

shows the cornea clear and free from scars, aqueous clear, iris free from adhesions and pigment deposits. Pupils slightly dilated reacting slowly to light and accommodation. Power of convergence retarded, lens clear and normal. Vitreous clear and not fluid. At the macular region there is a slightly depressed elliptical shaped area, the long axis of which is equal in length to three-fourths the diameter of the disc; this axis if extended toward the nose would strike the upper margin of the disc, the width is equal to one-half the diameter of the disc. The exposed choroid in the bottom of the depression is of a light cherry red color. The margin of the retinal hole is a dark red color. The surface of the exposed choroid is free from pigment but is covered with many white exudative specks, one-half millimeter each in diameter, giving a mottled appearance. Radiating in all directions from the margin of the retinal hole for a distance equal to two-thirds the diameter of the disc is a stellate formation of pigment deposit on the retina, the pigment collected in crooked lines, resembling the legs of a bug. The vessels normal, disc normal in shape and color. No rupture of the choroid or choroiditis. An absence of white exudative specks outside of the retinal hole. Large central scotoma. See Plate XVIII, No. 5.

CASE 6. Private C. T. (Col.) Age 22 years; farmer; single; specific history; Res. Taylor, Tex. Ex. July 16, 1918.

History. Was hit in the right eye with a baseball four years ago, prior to the accident one eye was as good as the other; following the injury the right eye was very painful for one week with only light perception; later the vision gradually returned to its present strength; and the eye has given no pain or discomfort other than the dimness of vision. The eye had not been examined by a doctor before entering the army.

Examination. Vision R. 10/200; L. 20/20. Examination of the right eye shows the cornea clear and free from scars, aqueous clear, iris free from adhesions and pigment deposits. Pupil slightly dilated, reacting to light and accommodation. Power of convergence retarded. Lens normal. Vitreous clear

and not fluid. At the macular region there is a slightly depressed circular area, with a diameter equal to one-half the diameter of the disc; the exposed choroid at the bottom of the retinal hole is a dark cherry red color. The margin of the retinal hole has a sharply cut edge, which is slightly pigmented. A slightly pigmented area, the diameter equaling the whole area, is sprinkled with exudative white specks, one and two millimeters each in diameter. These white exudative specks have distinctly pigmented margins resembling small patches of choroiditis. The disc is normal in shape and color. Vessels normal. No rupture of the choroid or choroiditis. Large central scotoma.

CASE 7. Private A. M. (Col.) Age 32 years; cook; married; Res. Houston, Texas. Ex. Aug. 29, 1918.

History. Hit in the left eye with a stick ten years ago; prior to this injury the vision was as good in one eye as in the other. The eye was painful and swollen for weeks following, but later the vision slowly returned to its present strength; tried to get glasses several times but never had the eye examined by a doctor. Four weeks ago was hit in the same eye with a bottle, after which could not see anything but the light until a few days ago. Specific history.

Examination. R. 20/20; L. 10/200. The left eye shows the cornea clear and free from scars; aqueous humor clear, iris free from adhesions and pigment deposits that might suggest an old iritis. Pupil dilated, reacting slowly to light. External squint, absence of power of convergence and accommodation. At the macular region there is a slightly depressed circular area with a diameter equaling one-fourth the diameter of the disc. The bottom of the depression is covered with exposed choroid, the surface of which is sprinkled with many small pigment spots, giving a mottled appearance. Around the retinal hole on the retinal surface is a halo of densely deposited pigment. In the densely pigmented area are several small specks of white exudate, one millimeter each in diameter, but there is an absence of these specks on the surface of the exposed choroid at the bottom of the retinal hole. Between the retinal hole

and the disc is a light pinkish colored subhyaloid hemorrhage, about the size of the disc, resembling a duck turned wrong side up, with its neck extending directly below the center of the retinal hole. Between the subhyaloid hemorrhage and the disc is a fresh retinal hemorrhage four millimeters in diameter. The fresh and the subhyaloid hemorrhages are the results of the last injury, while the retinal hole is the result of the first accident. No rupture of the choroid or choroiditis. Disc normal in shape and color. Large central scotoma. Tension normal. See Plate XVIII, No. 7.

CASE 8. Private I. C. (Col.) Age 27 years; round house laborer; married; specific history. Ex. July 17, 1918.

History. Hit in the right eye with a stone seven years ago, prior to the injury could see as well out of one eye as the other; following the accident the eye was badly swollen and painful for several days; the vision gradually returning to its present strength. The right eye has not given one moment's trouble other than dimness of vision.

Examination. Vision R. 10/200; L. 20/20. The right cornea is clear and free from scars; aqueous humor clear, iris free from adhesions and pigment deposits. Pupil slightly dilated, reacting to light and accommodation slowly. Power of convergence reduced, lens normal, vitreous clear and not fluid. At the macular region there is a slightly depressed circular area, with a diameter equal to three-fourths the diameter of the disc. The exposed choroid at the bottom of the depression is a dark cherry color. The distinct sharply cut retinal margin is much darker, due to a deposit of pigment, around the edge of the retinal hole. On the exposed choroid are a number of pigmented specks, two millimeters each in diameter, giving the surface a mottled appearance, resembling a ripe red raspberry. A halo, one-half the disc diameter in width, surrounds the retinal hole, made up of pigment deposits in streaks radiating from the outer margin of the retinal hole like the petals of a sunflower. Among the crooked pigmented streaks are many white exudative specks, one-half to two millimeters each in diameter. There is an absence of

white exudative specks on the surface of the exposed choroid. Vessels normal. Choroid not ruptured and free from choroiditis. Large central scotoma. Tension normal. See Plate XVIII, No. 8.

CASE 9. Private F. L. W., Co. F., 35th Infantry, age 24 years; farmer; single. Res. Springfield, Col. Ex. Nov. 18, 1918.

History. Hit in the right eye with a baseball fourteen years ago. Following the injury the eye was painful and badly swollen for two weeks. Prior to the injury the vision was as good in one eye as in the other. The eye has not given one moment's trouble, other than the reduction of vision. The sight in the right eye gradually returned to its present strength soon after the removal of the bandages following the accident.

Examination. Vision R. 20/200; L. 20/20. The right cornea is clear and free from scars; aqueous is clear; iris free from adhesions and pigment deposits; pupil semidilated, and reacts slowly to light and accommodation. Power of convergence reduced. Lens normal. Vitreous clear and not fluid. At the macular region there is a slightly depressed elliptical area, the long axis of which is equal to one-half the diameter of the disc. This axis if continued would pass up and in to a point one disc diameter above the disc. The transverse diameter is equal to one-third the disc diameter. The exposed choroid at the bottom of the depression, is a dark cherry red color. On its surface are five pigmented specks, one millimeter each in diameter and seven white exudative specks of the same size, free from pigmented margins. The margin of the retinal hole has a sharply cut edge with a darker color than the exposed choroid. Around the elliptical retinal hole is a halo three millimeters in width, of a light gray color, due to a detached retina, the outer margin of which is a trifle darker. Beyond the outer margin of the detached retina on the surface of the attached retina, completely surrounded by a halo, are some fifty small white exudative specks, two and three millimeters each in diameter, free from pigmented margins. In the vitreous, are five bright stationary scintillans, equally distributed.

Disc normal in shape and color. Choroid free from rupture and choroiditis. Vessels normal. Large central scotoma.

CASE 10. Private H. I. H. Age 22 years; farmer; single. Res. Brice, Texas. Ex. Nov. 9, 1918.

History. Hit in the right eye with a piece of wire when seven years of age; does not remember the accident but has been told one eye was as good as the other before the accident. Has not had one moment's pain or trouble with the eye other than reduced vision.

Examination. Vision R. 20/200; L. 20/20. Tension of the right eye normal; cornea clear and free from deposit. Pupil slightly dilated, reacting slowly to light and accommodation. Power of convergence reduced. Lens normal. Vitreous clear and not fluid. At the macular region there is a slightly depressed circular area the diameter of which is equal to one-third the diameter of the disc. The exposed choroid in the retinal hole is a light pink color. The margin of the retinal hole is sharply cut and darker red. On the surface of the exposed choroid many small white exudative specks, one half millimeter each in diameter. Absence of pigment in the bottom of the retinal hole, but on the retina toward the disc side, of the retinal hole, is a mass of exudate, covered with densely deposited pigment, giving the appearance of an apple seed, extending slightly over the retinal hole, on the side toward the disc. Around the retinal hole, and the pigmented exudate is a light halo, giving the appearance of thin choroid two millimeters in width. Directly over this area are ten or twelve white exudative specks, one and two millimeters each in diameter, free from pigment deposits. Disc appears to be elliptical in shape but this is explained by the fact that there is corneal astigmatic error of three diopters. Vessels normal. Choroid free from rupture and choroiditis. The body is covered with a severe impetigo, that has been present since childhood. No specific history. Large central scotoma.

CASE 11. Private G. L. (Col.) Age 22 years; farmer; single. Res. Beaumont, Texas. Ex. May, 1918.

History. Specific history. Hit in left

eye when a baby two and one-half years old, causing the reduction of vision. Gives a history of several hard blows to the left eye, but claims the vision was poor in the left eye before they were received. Very little confidence is placed in the story of the injury claimed to have happened when a mere baby.

Examination. Vision R. 20/15; L. 20/200. Tension normal. Left eye cornea clear and free from scars; aqueous humor clear, iris free from adhesions and deposit of pigment. Pupil slightly dilated, reacting to light and accommodation slowly. Power of convergence reduced. Lens normal; vitreous clear and not fluid. Below the macular region is a slightly depressed circular area, with a diameter equal to two-thirds the diameter of the disc. The exposed choroid at the bottom of the retinal hole is a dark cherry red color, with considerable deposit of pigment, giving the mottled appearance of a red raspberry. The margin of the retinal hole has a sharply cut edge, slightly darker than the exposed choroid. A rupture of the choroid extends across the bottom of the retinal hole. The rupture is vertical, extending to the retinal margins only, exposing a strip of sclera, forked at the upper one-fourth, one millimeter in width, and free from pigment deposit. This retinal hole is directly under the fovea centralis which is covered with a speck of white exudate two millimeters in diameter, free from pigment deposit. On both sides of the fovea centralis in the retina above the retinal hole, are remnants of a retinal hemorrhage of long standing, dark red in color. Vessels normal. Choroid free from ruptures outside of the retinal hole. No choroiditis. Large scotoma in the upper half of the field. See Plate XVIII, No. 11.

CASE 12. Private M. S. (Col.) Res. Pledger, Texas. Ex. July 17, 1918.

History. Age 24 years; farmer; married; specific history; left eye has been poor all his life; does not remember having had it injured. Sight slowly left the eye without pain or trouble of any kind several years ago.

Examination. Vision R. 20/20; L. 20/200. Tension normal. The left cornea is clear and free from scars; aqueous

clear; iris free from adhesions and pigment deposits. Pupil slightly dilated reacting slowly to light and accommodation. Power of convergence reduced. Lens normal. Vitreous clear and not fluid. At one-third the distance between the disc and the macular region, is a lightly depressed elliptical area, the long axis of which equals in length one-third the diameter of the disc, and if extended would pass up and in, at the angle of 10 o'clock. The transverse diameter equals one-fourth the disc diameter. The exposed choroid in the bottom of the retinal hole is a dark cherry red. On the surface of the exposed choroid are seven white exudative specks, one-half millimeter each in diameter, free from pigment. The margin of the retinal hole has a sharply cut edge, slightly pigmented, giving the appearance of a distinct ring. The macular area is normal, free from exudate and choroiditis. A triangular mass of gray exudate extends into the vitreous from the surface of the retina in the upper nasal quadrant of the fundus. Each end of the exudate at the base of the triangle is attached to the retina along a distance equal to one diameter of the disc. One attachment below the nasal side of the disc, the other above, slightly to the temporal side. The position of the exudate causing the base of the triangle is equal in length to five disc diameters. The anterior point of the triangle is equal in length to five disc diameters. The anterior point of the triangle extends forward thru the vitreous a distance equal to the length of the base. The arm of the triangle extending forward is contracted, giving the appearance of an icicle. Near the center of the triangular exudate, extending forward is a circular hole, with a diameter equal to one-fourth the diameter of the disc. Thru the hole in the exudate can be seen the black pigment deposit on the surface of the retina, under and around the base of the triangular exudate. The exudate is in front of the retinal vessels, but there are several small vessels on the surface of the exudate. A disseminated choroiditis, with its bone corpuscle appearing as patches, extends over the whole fundus. No rupture of the choroid. Disc normal in size and color except one pigmented

spot three millimeters in diameter on the temporal side of the disc extending to the edge of the physiologic cup. Field of vision shows the temporal half dark. See Plate XVIII, No. 12.

Case 13. Private A. M. (Col.) Res. Grapeland, Texas. Ex. Aug. 1918.

History. Age 24 years; married; farmer; specific history: two years ago hit in the right eye with a baseball; prior to the injury one eye was as good as the other. Following the accident the eye was painful and badly swollen for ten days; the sight gradually returning to its present strength; and has not given one moment's trouble, except the dimness of vision.

Examination. Vision R. 10/200; L. 20/20. Tension normal. The right cornea is clear and free from scars, aqueous clear, iris free from adhesions and pigment deposits. Pupil one-fourth dilated, reacting to light and accommodation slightly. Power of convergence greatly reduced. Lens normal. Vitreous clear and not fluid. At the macular region is a slightly depressed circular area, the diameter of which is equal to one-eighth the diameter of the disc. The exposed choroid at the bottom of the retinal hole is a light pink color, free from pigment and white exudative specks. To the temporal side of the retinal hole, on the surface of the retina, is a crescentic shaped exudate, deeply pigmented, three millimeters in width, that extends one-half around the retinal hole; in this same case is a crescentic shaped pigment deposit, of the same width, but free from exudate, giving a gray color. Around the macular hole, in the pigmented area is a distinct halo of white exudate and pigmented streaks, two-thirds the disc diameter in length, radiating from the margin of the deeply pigmented area at the macular region, resembling a daisy, or the picture that is often seen in cases of albuminuric retinitis. Vessels are normal. Choroid free from rupture and choroiditis. Tension normal. Field of vision shows a large central scotoma. Disc normal in shape and color.

CASE 14. Private O. A. C. (Col.) Res. McLannon, Texas. Ex. Aug. 9, 1918.

History. Age 27, 1918; farmer; married. Hit in the right eye when a child, with a stone. Cannot tell when the accident occurred, but remembers the eye was painful and swollen for a number of days. Prior to the injury could see as well out of one eye as the other. Since then the eye has not given one moment's trouble except the dimness of vision.

Examination. Vision R. 10/200; L. 20/20. Tension normal. Right cornea clear and free from scars; aqueous clear, iris free from adhesions and pigment de-

rupture and choroiditis. Disc normal in shape and color. Large central scotoma.

CASE 15. Private H. B. (Col.) Res. Nansota, Texas. Ex. Aug. 1, 1918.

History. Hit in the left eye with a bottle ten years ago; prior to the injury could see with one eye as well as the other; following the accident, eye was swollen and painful for two weeks. The vision returning to its present strength in a short time, and has not given one moment's trouble, except the dimness in vision. Did not have the eye examined by a doctor before entering the army.

Examination. Age 31 years; blacksmith; married; Vision R. 20/20; L. 10/200. Tension normal. Left cornea clear and free from scars. Aqueous clear; iris free from adhesions and pigment deposit. Pupil slightly dilated reacting slowly to light and accommodation. Power of convergence reduced. Lens normal; vitreous clear and not fluid. At the macular region is a slightly depressed circular area, the diameter equals one-third the diameter of the disc. The exposed choroid at the bottom of the retinal hole is of a dark cherry red color. On its surface are three white exudative specks one millimeter each in diameter, red from pigmented margins. No pigment deposit on the surface of the exposed choroid. Retinal margin has a sharply cut pigmented edge, making a distinct ring. Rupture of the choroid, crescentic in shape, two and three millimeters in width, four disc diameters in length, exposing the sclera. A pigmented margin of retina, four millimeters in width, on both sides of the rupture, extends vertically on the temporal side of the retinal hole, the center of the ruptured choroid opposite and separated from the temporal side of the retinal hole by a narrow band of retina, two millimeters in width. The concavity of the rupture is toward the disc. The exposed sclera is of a light gray color, due to thin pigmented exudate. Vessels are normal, crossing the rupture in several places at right angles, nonparallel with choroidal rupture. No choroiditis. Disc normal in shape and color. The field of vision shows the nasal half dark.

CASE 16. Private C. D. (Col.) Res. Belton, Texas. Ex. Aug. 23, 1918.

Case 14.

posits. Pupil slightly dilated and responds to light and accommodation sluggishly. Power of convergence slow. Lens normal. Vitreous clear and not fluid. At the macular region there is a slightly depressed circular area, the diameter of which is equal to one-half the diameter of the disc. The exposed choroid at the bottom of the retinal hole is a light cherry red color. The surface of the choroid is free from pigment deposit, but is covered with small white exudative specks, one-half millimeter in width, extends one-half the circumference of the retinal hole on the nasal side; the temporal half of the circumference has a pigmented halo four millimeters in width, but much thinner. Absence of white exudative specks. Vessels are normal. Choroid free from

History. Age 25 years; farmer, married; specific history. Hit in the right eye with a baseball seven years ago, prior to the accident one eye was as good as the other; following the injury the eye was painful and swollen for several days, but did not have the eye examined by a doctor. In a few days following the disappearance of the swelling, the vision returned to its present strength. The eye has not given one moment's trouble except the dimness of vision.

Examination. Tension normal. Cornea clear and free from scars; aqueous clear; iris free from adhesions and pigment deposits. Pupil slightly dilated, reacting slowly to light and accommodation. Power of convergence reduced. Vitreous clear and not fluid. At the macular region is a circular area three millimeters in diameter, slightly depressed; the exposed choroid at the bottom of the retinal hole being a very light pink color. The exposed choroidal surface is free from white exudate specks and pigment. Rupture of the choroid, crescentic in shape, one millimeter in width, three disc diameters in length, on the temporal side of the retinal hole, extending vertically exposing the sclera. The concave side of the crescent is toward the disc. The center of the crescent is opposite the retinal hole, and separated from it by a band of retina one millimeter in width. The retina is deeply pigmented for a distance of three millimeters on both sides of the choroidal rupture. Absence of white exudative specks on the retina. Vessels normal. Many arterial and venous branches crossing the choroidal rupture at right angles; none parallel with the rupture. Disc normal in size, shape and color. Large central scotoma.

CASE 17. Private H. A. H. Ex. Aug. 5, 1918.

History. Age 22 years; married; no specific history; R. R. car man; hit in the right eye two years ago with a large piece of steel; following the accident the eye was very painful and swollen, requiring bandage for more than one week. Prior to the injury could see as well with one eye as the

other. The vision slowly returned to its present strength and has not given one moment's trouble outside of the dimness of vision.

Examination. Vision R. 10/200; L. 20/20. Tension normal. Cornea clear but shows a faint central scar. Aqueous clear; iris free from adhesions and deposit of pigment. Pupil slightly dilated reacting slowly to light and accommodation. Power of convergence reduced. Vitreous clear and not fluid. At the macular region there is a slightly depressed circular area four millimeters in diameter. The exposed choroid at the bottom of the retinal hole is a light cherry color, free from white exudative specks and pigment deposits. The retina is pigmented slightly, a distance of one disc diameter in width completely around the retinal hole. This pigmented area is free from white exudative specks, but there is a very dense black deposit of pigment on three sides of the retinal hole, four millimeters in width on the upper, lower and nasal side. The densely pigmented retina on the nasal side of the retinal hole also extends toward the disc eight millimeters in length, giving the whole densely pigmented area the appearance of a lobster's claw, opened. Vessels normal. No choroiditis or rupture of the choroid. Disc normal in shape and color. Large central scotoma.

CASE 18. Private J. F. R. (Mex.) Stockdale, Texas. Ex. August 29, 1918.

History. Hit in the left eye with a stick one year ago. Prior to the accident could see as well with one eye as the other; following the injury, suffered with considerable pain. The eye was badly swollen for several days, but did not consult a doctor. Vision slowly returned to its present strength and the eye has not given one moment's pain or trouble except the dimness of vision.

Examination. Tension normal. Cornea of the left eye clear and free from scars; aqueous clear, iris free from adhesions and pigment deposit. Pupil slightly dilated, reacting slowly to light and accommodation. The power of convergence reduced. Vitreous clear and not fluid. At the macular region there is a slightly depressed circular area three millimeters in diameter. The exposed chor-

oid at the bottom of the retinal hole is of a dark cherry red color; on its surface are two small circular white exudative specks, one millimeter in diameter with pigmented margins. The margin of the retinal hole has a sharply cut edge, slightly pigmented, giving it the appearance of a narrow ring. Extending down and toward the disc from the lower edge of the retinal hole, is a rupture of the choroid twelve millimeters in length and two millimeters in width, exposing the sclera. The tear is at an angle, with the macula, equal to four on the clock dial. On each side of the rupture is a deposit of pigment in the retina, the pigmented area extending beyond the retinal hole. The rupture does not continue into the retinal hole, but to a point within three millimeters. Vessels normal, some of the smaller vessels crossing the rupture at right angles, but none directly over, or parallel to, the tear. Disc normal in size and color. Large central scotoma.

CASE 19. Private M. B. (Col.) Co. 5, 165 D. B. Ex. April 2, 1918.

History. Was struck in the right eye with a stone when eight years old and has not seen well out of the eye since. Before the injury could see as well out of one eye as the other. The eye has not given one moment's trouble since, never pains or gets red and inflamed. Has not had the eye examined by a doctor before entering the army. No specific or tubercular history.

Examination. No squint. Tension normal. Right cornea clear and free from scars. Anterior chamber deep. Aqueous clear. Iris free from adhesion and pigment deposit. Pupil reacted slowly to light and accommodation. Power of convergence sluggish. Lens normal. Vitreous clear and not fluid. Disc normal in size and color. Vessels normal. No choroiditis or rupture of the choroid. At the macular region is a slightly depressed circular area. The diameter of the retinal hole is equal to one-third the diameter of the disc. The exposed choroid is a dark cherry red color covered with a fine sprinkling of pigment. The margin of the retinal hole is sharply cut and slightly increased in pigment, giving the appearance of a ring. Around the retinal hole is a halo of pigment and white

exudate equal to one disc diameter in width. The pigment is deposited in streaks radiating from the margin of the hole, with white exudate between the streaks, giving the appearance of a daisy. Field of vision shows a large central scotoma. R. 1/200; L. 20/20.

CASE 20. Private A. V. Co. 6, 165 D. B. Ex. April 4, 1918.

History. Was shot behind the right eye when fourteen years old, the bullet did not strike the front part of the eye but went in at the side. At the time of the injury the eye was very painful

Case 19.

and blind. The sight slowly returned to the present strength. The eye has not given one moment's trouble other than the reduced vision.

Examination. Vision R. 20/100; L. 20/20. No specific or tubercular history. Farmer; 22 years old. No squint. Tension normal. Cornea of right eye clear and free from scars. Anterior chamber deep; aqueous clear. Pupil dilated, reacting slowly to light and accommodation. Power of convergence reduced. Iris free from adhesions and pigment deposit. Lens normal. Vitreous clear and not fluid. Vessels normal. Disc normal in size and color. At the macular region is a slightly depressed circular area the diameter equaling one-fourth the

diameter of the disc. The retinal margin is sharply cut and slightly pigmented, making a slight ring. The exposed surface of the choroid is a dark cherry red color, sprinkled with pigment resembling emery dust. On the temporal side of the hole is a bifurcated choroidal tear exposing the sclera. The edges of the tear are pigmented and separated two to three millimeters. On each side of the tear are two circular spots of choroiditis three millimeters each in diameter exposing the sclera. The tear is in the position of eight o'clock from the retinal

Case 21.

hole, the bifurcation toward the upper end. The length of the tear is three disc diameters, the bifurcation beginning near the center. Several vessels pass across the floor exposed by the tear. No white exudative specks. Field shows nasal half dark.

CASE 21. Sgt. F. E. T., Co. C. 22, B. N. U. S. G. of Alston, Mass. Ex. Dec. 8, 1918.

History. Enlisted May 25, 1917, Ft. Slocum, N. Y. Single; waiter. Age 27 years. Hit with a stone May 28, 1918, while on rifle range at Sour Lake, Texas. Was in Camp Logan hospital 47 days. Prior to the accident one eye was as good as the other; following the injury the vision has continued to fail.

Examination. Vision R. 20/200; L. 20/20. No squint. Tension normal. Right cornea clear and free from scars. Anterior chamber deep, aqueous clear. Pupil dilated reacting to light and accommodation slowly. Power of convergence sluggish. Lens normal. Vitreous clear and not fluid. Vessels normal. Disc atrophic and elliptical, long axis vertical. The macular region shows a slightly depressed circular area, the diameter of which equals one-third the diameter of the disc. The exposed choroid at the bottom of the retinal hole is a dark cherry red color, the surface covered with a fine emery dust like pigment. The margin of the retina is sharply cut and slightly pigmented, giving a ring effect. Between the retinal hole and the disc is a large choroidal tear filled with an exudate. The tear is a semicircular affair the concavity of the tear toward the disc, the center of the tear passing near the disc margin of the retinal hole. The tear is six disc diameters in length, at the widest point one disc diameter in width. Near the center of the tear is a bifurcation down and in toward the disc beginning near the retinal hole extending to the vessels directly below the disc. Between the disc and the margin of the choroidal rupture, is a torn choroid in a worm-like shape one millimeter wide connecting the disc and the tear. A gray pigmented exudate fills the tear in the center but at each end is absent, several vessels passing over the sclera. Field of vision not taken.

CASE 22. Private N. W. (Col.) Co. 72, 165 D. B. Ex. May 9, 1918.

History. Hit in the left eye with a stone when fourteen years of age, the eye was badly swollen and bloodshot for two weeks following the accident. Prior to the injury one eye was as good as the other. The vision gradually returned to its present strength in the left eye, never giving the slightest trouble other than the reduction of vision. Never consulted a doctor or had the eye examined before entering the army.

Examination. No squint. Tension normal. Gives a specific history. Age 24 years. Single; farmer. Vision R. 20/70; L. 1/200. Left cornea clear and

free from scars. Anterior chamber deep. Aqueous clear. Pupil slightly dilated, reacting to light slowly. No reaction to accommodation. Power of convergence reduced. Iris free from adhesions and pigment deposit. Lens normal. Vitreous clear and not fluid. Vessels normal. Disc normal in size and color, the macular region shows a slightly depressed circular area the diameter equaling one-half the disc diameter in length. The margin of the retinal hole is sharply cut and deeply pigmented giving the retinal margin an appearance of a distinct black ring. The surface of the exposed choroid is a dark cherry red color; is covered with a sprinkling of pigment resembling emery dust. An absence of pigmented deposit in the retina around the retinal hole as well as an absence of white exudative deposit spots. Directly below the center of the retinal hole is a rupture in the choroid extending down and in turning toward the disc making a semicircle, striking the lower border of the disc directly in the center. This rupture of the choroid follows one of the main branches of the inferior retinal vein. The rupture is five millimeters wide, exposing sclera in the center of the rupture, parallel with the long axis is a retinal vein. The rupture is not continuous from the hole in the retina to the disc; one-half the distance between the disc and the hole is an isthmus of healthy retina and choroid four millimeters in width, this point corresponds with a bifurcation of the vein. Slight pigment deposit along the line of rupture in the retina and a slight deposit smeared over the exposed sclera. Field of vision not taken. No choroiditis.

CASE 23. Private G. S. (Col.) Co. 71, 165 D. B. Ex. May 9, 1918.

History. When a child six years old was hit in the left eye with a stone, the eye was swollen and painful for two weeks following the accident the vision gradually returning to its present strength. Prior to the injury could see as well with one eye as the other. Never had the eye examined by a doctor before entering the army, having no trouble other than the reduction in vision. No specific or tubercular history.

Examination. No squint; tension normal; vision R. 20/10; L. 10/200. Age 22 years; farmer; single. Left cornea clear and free from scars. Anterior chamber deep; aqueous clear. Pupil semidilated, reacting slowly to light and accommodation. Power of convergence reduced. Iris free from adhesions and pigment deposit. Lens normal. Vitreous clear and not fluid. Disc normal in size and color. Vessels normal. No rupture of the choroid or choroiditis. One-half the distance between the disc and the fovea centralis in the left eye is a slightly depressed circular area the diameter of which is equal to one-half the diameter of the disc. The exposed choroid at the bottom of the retinal hole is a dark cherry red color covered with a sprinkling of fine pigment resembling emery dust. The margin of the retina is sharply cut and deeply pigmented giving the appearance of a distinct ring, at the margin of the retinal hole. There is an absence of pigment deposit in the retina about the hole, also complete absence of white exudative specks.