The Importance Of Early Diagnosis In Narrow Angle Glaucoma

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THE IMPORTANCE OF EARLY DIAGNOSIS
IN NARROW ANGLE GLAUCOMA*
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Glaucoma is a disease or a number of diseases in which the intraocular pressure is elevated above normal. Today we shall confine our discussion to primary glaucoma which eliminates all those secondary to trauma, neoplasma, primary infections, etc. To give a definition of primary glaucoma that illustrates this phase of the subject, the following simplification is made.

An eye which is healthy and has a normal intraocular pressure is one in which the amount of aqueous flowing in equals the amount of aqueous flowing out. If the outflow becomes obstructed and the inflow remains the same, the intraocular pressure rises; or if the resistance to outflow remains the same and the inflow increases, the intraocular pressure will rise.

We have two primary means of medically controlling this pressure. One is by the use of Pilocarpine or other miotics in which the outflow is increased. The second is the use of Acetazolamide (Diamox) orally which suppresses formation of aqueous and thereby reduces the intraocular pressure. If the combination of these two methods fails to control the tension of the eye, then we resort to surgery to (1) form another outlet, (2) create freer access to the normal outlet, (3) reduce inflow or (4) some combination of these.

As in all diseases, the earlier the diagnosis is made the better the outlook for the patient. I believe the evidence I am about to submit shows the importance of the role played by the ophthalmologist in detecting early glaucoma. It is an insidious disease which at first is practically symptomless. This may remain true almost up to the time when vision fails completely.

In 1,184 routine refractions done on patients 40 years of age and over in the past 14 months, there were 46 with an elevated tension, an incidence of 3.8%. Elevated tension was disclosed by taking routine measurements with a Schiotz Tonometer. This instrument has a foot plate which rests upon the cornea and a plunger which sinks into the cornea a varying distance, according to the resistance afforded by the intraocular pressure. The amount it displaces the cornea inward registers on a scale. This reading is translated into millimeters of mercury of intraocular pressure.

At the conclusion of each of these 1,184 routine refractions, with eyes still under the influence of full mydriasis or dilatation, tensions were taken. Forty-six patients showed elevations of 26 or over. Of this group, a diagnosis of glaucoma subsequently was established in 31 patients; 12 are currently glaucoma suspects and in 3 the possibility of glaucoma has been ruled out. Thus one sees that 43 unsuspected cases

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of elevated tension would have been missed had they not been screened by routine tonometry.

Before we pass onto the classification of glaucoma, let us consider momentarily some of the theories on the causes of glaucoma. Up until the past few years all we knew was that aqueous entered the eye largely via the ciliary body, flowed into the anterior chamber through the pupillary area, then out of the anterior chamber into the Canal of Schlemm and from there passed into the general circulation. Many theories have been postulated in the past hundred years dealing with the electrolyte balance, the molecular pressure, hydrostatic pressure and osmotic pressure as they are related to the blood aqueous barrier, etc., as well as the mechanical situation. All of these theories can be classified under two main headings, the mechanistic theory and the neurovascular theory. There is no doubt that each theory has an element of truth but since the latter does not lead us toward a different or better treatment in our present scientific status, I have become an advocate of the mechanistic theory.

This theory does force us to analyze the cause of each case of glaucoma. This in turn guides us to a more logical management of glaucoma. This group temporarily discounts the neurovascular theories and explains glaucoma on the basis that the fluid cannot get out either because of obstruction to the outflow at the root of the iris or by changes in the wall of the eye which prevent the aqueous from passing through it. It is my wish to keep the classification simple and at the same time make it practical so that a better pattern of treatment can be developed. I have adopted for my use Kronfeld’s classification. He divides all eyes:

Situation A — a deep anterior chamber and wide roomy angle

Situation B — a fairly deep anterior chamber but the angle is narrow and the iris has an appearance of an iris plateau.

Situation C — a shallow chamber and the angle is narrow throughout.

My first step after detecting an elevated tension is to attempt to classify the eyes into Situation A, B, and C. Situation A and C can be readily determined by inspection alone. First with the slit lamp which shows the depth of the anterior chamber and then with the gonioprism (which brings the angle of the eye into view), either the angle is very wide and roomy or it is narrow and pinched. This then classifies two groups characteristically — a Situation A and a Situation C. Situation C is typically a small, hypermetropic eye, and it is so characteristic that even the unscientific casual observer notices it.

Situation B remains. These cases must be sifted out and it must be decided which one belongs in A or C as far as their glaucoma mechanism is concerned. For this purpose I use two provocative tests. First, a mydriatic, which in the case of Situation C closes the angle and precipitates a rise in pressure thus confirming it as a narrow angle glaucoma. If a mydriasis has no effect, but upon drinking one quart of water on a fasting stomach and then taking the tension half an hour later,
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the tension rises 8 m.m. of mercury or more, the test is indicative of potential wide angle glaucoma. Obviously, the obstruction is then located in the wall of the eye in the filtering system located in the angle.

In the past five years there has been the development of another method of studying the intraocular pressure known as tonography. This is where an electric tonometer, basically more precise than the usual mechanical Schiotz Tonometer, is hooked up with a recording device. When the foot of the tonometer is placed upon the eye and held there for a period of four minutes, a tracing is made. This tracing gives us a measure of the facility of outflow of the eye. That is, we can calculate from it the approximate volume of aqueous which flows out of the eye per minute per millimeter of mercury pressure. Tonography has a fairly large percentage of error, so one tracing often does not clinch a diagnosis. By taking tonograms when the patient is under miotics or after ingesting a quart of water, the appearance of the tonogram and the changes of the facility of outflow does materially aid us in telling the type of glaucoma that exists or whether glaucoma is present or absent.

The last and one of the oldest means of evaluating the state of an eye with glaucoma is by visual fields. However, in narrow angle glaucoma, changes may not occur until very long after diagnosis is possible by other means. Fields only show the extent of damage to the eye up to that time.

Narrow angle glaucoma which is not diagnosed means the development of anterior synechia. This means a reduction in the access of the aqueous to the filtering system which is contained in the wall of the eye. When the iris becomes pushed up against the posterior surface of the cornea, the entry way to the filtering system in the wall of the eye located at the limbus is obstructed. Then results rises of intraocular tension ranging from minimal and symptomless to moderate subacute attacks associated with some pain in the eye and blurring of vision. When pressure rises greatly, there develops an edema of the cornea, such as seen in an acute glaucoma attack. The edema is not confined to the cornea but involves the sclera, the entire angle of the eye including the ciliary body, thus the entire filtering system is involved. The filtering system consists of the trabeculae, then the Canal of Schlemm, the anterior collecting chambers, and finally the aqueous veins which dump into the veins themselves.

Having established whether the eye is a narrow angle or a wide angle, we then pass to the treatment. In the event that a wide angle glaucoma is detected, the treatment is not fully satisfactory whether it is medical or surgical. Since surgical treatment is often disappointing, the accepted procedure is to treat the wide angle case medically as long as possible. When evidence of deterioration of the eye appears, that is, visual field changes and uncontrolled tension, surgical intervention is adopted. In general it is accepted that filtering operations are about 66% successful. Thus, one can see that in wide angle glaucoma the treatment leaves much to be desired.

The treatment of very early narrow angle glaucoma is far more satisfactory because in narrow angle glaucoma the chief difficulty is obstruction of the aqueous in
entering the filtering system. In this case a miotic pulls the pupil down to a pinpoint and also pulls the iris root away from the trabeculae, thus opening the angle wider. Everyone agrees that there is such a thing as iris block glaucoma or closed angle. This has been repeatedly demonstrated clinically and in the laboratory. But if the angle is narrow but open, then there is a great difference of opinion as to whether this can be causing the rise of pressure or not. It is my feeling that a narrow angle, though it may not be closed, does produce a relative block or closure angle glaucoma. For example, if people are passing through a doorway which is wide open, the doorway is being used to the maximum benefit; however, if the doorway is fixed to halfway open, everyone knows that only a fraction of the original number of people can pass through that doorway at the same time as they could if the door were wide open. I feel this is similar to a narrow angle eye.

In a typical narrow angle in a hyperopic eye, where intermittent closing of the angle occurs, obstruction to the entrance of the filtering system can be completely relieved by making a small peripheral iridectomy or an opening in the periphery of the iris. If the narrow angle glaucoma is not treated, then the repeated assaults of slight edema produce permanent irreversible changes in the angle. Then, when this eye begins to show deterioration, a peripheral iridectomy will no longer be curative, but a filtering operation would be indicated. For this reason I feel that the narrow angle glaucoma should be detected as early as possible and the patient immediately be subjected to prophylaxis in the form of a peripheral iridectomy. If he will not agree to this, he must of course be kept on a prophylactic medical regime of miotics, to prevent an acute attack of glaucoma.

In the past eight years I have operated 38 eyes which I had diagnosed as having narrow angle glaucoma. 33 of these were successful, that is their tension has remained normal since surgery without any medication whatsoever. Four have been improved, that is the pressure remains under control with miotics. One received no benefit at all, but actually has been worse.

In again looking at an angle of an eye which is magnified, it will be noticed that the more narrow-angle the eye is, the more cramped are all of the anatomical parts. The suggested location for a scratch incision in performing a peripheral iridectomy, is 2 mm. back of the limbus underneath the conjunctival flap. In the extreme narrow angle case this incision may open up just over the ciliary body and one may fail to establish communication with the posterior segment of the eye. Therefore, I suggest that the incision be made at the limbus as far forward as is possible under a conjunctival flap so that the incision opens into the anterior chamber for sure. As the incision penetrates, the iris immediately prolapses into the wound.

A frequent technique is that of sweeping the angle of the eye throughout 180 degrees to break up any anterior synechia which have formed. It is my feeling that such a procedure makes a peripheral iridectomy equivalent to a filtering operation and, therefore lowers the percentage of success. If a simple peripheral iridectomy is performed without any instrumentation into the anterior chamber, then one can figure on 95% success; that is, complete relief from glaucoma.
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According to my classification of 31 established cases of glaucoma, there were 4 that were wide angle, 22 that were narrow angle, and 5 unclassified. Thus approximately 70% can be relieved by a peripheral iridectomy. Therefore a small residuum of glaucoma will remain to be treated conservatively and in a somewhat unsatisfactory way until our knowledge progresses considerably further than it is at this moment.

In summary an ophthalmologist’s examination should include routine tonometry. This examination is essential to a general physical examination performed on people 40 years and over. Secondly all cases of a slightly elevated tension, i.e. 26 or higher, should be investigated further. Upon investigation they should be classified into narrow angle and wide angle, and the patient with a narrow angle glaucoma should be given the choice of an early surgical peripheral iridectomy, which can be curative or the medical regime. And last, treat all wide angle glaucoma conservatively or medically since surgical treatment is unsatisfactory in one third of the cases.

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