stages ought to be as close together as possible; and the only reason that there should be any time intervening is that there may be escape of aqueous through the puncture wound you have made in making a good capsulotomy, making the anterior chamber so shallow as to make the corneal incision very difficult, without waiting for the chamber to refill. A capsulotomy can be better made when there has been no incision in the cornea. When this is done freely—whether with the Ziegler, the Knapp or the Smith instrument—as Smith directs, the capsule will open widely. If, on withdrawing the instrument in a senile case, the aqueous does not escape we can go ahead and take the lens out without trouble. I believe if we would do the capsulotomy before making the corneal incision, we could more often do a simple extraction of the cataract in a more perfect sort of a way. After the capsule has been opened, while you have the eyeball fixed in its position, if the pupil is sufficiently open you may take the spatula and make pressure on the eye below, completing the operation in almost half the time that must elapse if we make the incision, then the capsulotomy and then the extraction. I am going to do the Homer Smith operation until the Hulen operation has been so perfected that there will be no necessity for leaving any capsule in the eye at all. The large opening in the anterior capsule after the Smith method must greatly lessen the necessity for secondary operations.

DR. EDWARD JACKSON, Denver: In reference to Schlemm's canal, some one within the last year published the result of his investigation, reaching the conclusion that it is a lymph space. I think perhaps the most important evidence on the matter is that developed by Salzmann by ophthalmoscopy of the angle of the anterior chamber. In his last paper on the subject he figures a line parallel to the periphery of the anterior chamber which he takes to be caused by Schlemm's canal, rather darker than the sclera, and varying as to how much darker. In only two cases has it shown any pink color. He believes that at times some blood may be mixed with the lymph, but generally it is simply a gray line, in contrast with the white sclera. I have seen it. With reference to the residence of the patient, of course discussion is only applicable for patients who can come again and again, without having to travel very far and without serious inconvenience. The cases I reported have all been treated outside the hospital. They were not confined to the house at any time, except in one case. The girl who suffered the most severe reaction, without rise of tension, and with symptoms of shock, and who has an abnormal eye, a congenital defect, was the only one seen outside the office. One patient lived in a city nearly 100 miles away, and came to Denver for the operation, remaining two or three days—Saturday to Monday. She had a rather important position. I think at one time she was in Denver perhaps ten days, although at that time the reaction was over in two or three days. Of course, the procedure is only applicable to those patients who can be kept under observation. The early development of the nucleus I think is to be rather expected with an early development that runs very much the course of senile cataract. Three of these cases were of that character. They developed probably after some uveal disease, but without any iritic adhesions and without any evidence of active disease for several years. None of them showed evidence of active uveal disease from the time the cataracts began to obscure the fundus, up to the time the view was cleared up, and I think none showed any extensive changes in the choroid since the cataract was cleared up. All of the nucleus, even if well developed, can and will be absorbed if time is given after sufficient needling. The point I would like to emphasize about the operation is that it is the size of the opening in the capsule that determines the danger of swelling, and of the lens material flowing into the anterior chamber, where it will cause either a rise of tension, or severe reaction without rise of tension, and the symptoms which we wish to avoid. The penetration of the nucleus is not followed by any particular reaction. If the nucleus is cut into pieces and fragments fall into the anterior chamber, you are practically certain to have reaction. But if the nucleus is punctured, even clear to the center of the nucleus, at the first puncture, it does not add to the reaction

that occurs, provided you have a small opening in the capsule. It is an established point that it is safer to cut freely an opaque lens than a transparent lens, as regards danger from subsequent swelling.

DR. W. E. BRUNER, Cleveland: I should have stated that I use homatropin before doing the preliminary capsulotomy, so as to get as large an opening in the capsule as possible. I make the puncture as Dr. Jackson does, through the corneal limbus. In my experience I have been surprised at the small amount of reaction that followed. I have done the capsulotomy in the morning, prepared to do the extraction of the lens later in the day if necessary.

RETINAL DETACHMENT IN HYDROPTHALMIA *

ARNOLD KNAPP, M.D.

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It is surely striking that patients with congenital glaucoma apparently disappear from view after a certain length of time; for it is very unusual to find persons with this disease in middle life, though there are some reports of cases in which the process has been spontaneously arrested and some sight retained. That these enlarged eyeballs are extremely susceptible to injury is natural, and unquestionably most of these eyes are enucleated after rupture following often a trivial injury. It is even reported that this rupture can occur spontaneously. Furthermore, the ectatic cornea in these glaucomatous eyes becomes easily infected and stands infection badly, so that a number of the eyes are probably lost from this cause.

I have had an opportunity of observing clinically a case of hydrophthalmia in which a detachment of the retina occurred spontaneously, and the eye then went on to phthisis bulbi. As this outcome is not mentioned in the textbooks, I deem it worthy of report.

The patient, F. B., aged 11, was brought to the Herman Knapp Memorial Eye Hospital, Nov. 28, 1914, with the statement that both eyeballs were enlarged from birth and that the right eye was injured by a blow four years ago and subsequently removed. The left eye was enormously enlarged with all the characteristics of hydrophthalmia. The cornea measured 16 mm. The vision was $\frac{1}{200}$. With the tonometer the tension was slightly over 30, and after the use of pilocarpin it was reduced to 27. As the tension could be controlled with pilocarpin, and on account of the extreme ectatic condition of the eyeball, an operation seemed inadvisable, though it had been proposed at one of the other eye hospitals. The patient was brought to us from time to time with practically no change in the condition, and with tension averaging 25, until March 19, 1915, when the eye was found to be unusually soft, and the vision greatly reduced. The field was contracted to a small area around the point of fixation, in which the patient was still able to count fingers directly in front of the eye. With the ophthalmoscope a distinct detachment of the retina could be made out, of the usual color without any evidences of a hemorrhage. The pilocarpin was stopped and atropin was ordered. The eye remained soft, and gradually became smaller and blind. Nov. 6, 1915, the eye was shrunken, and a cataract had developed to which the iris was adherent. There was no light perception.

Axenfeld¹ has reported a case which is similar to this, in which a detachment was discovered by the ophthalmoscope before phthisis set in. Axenfeld

* Read before the Section on Ophthalmology at the Sixty-Seventh Annual Session of the American Medical Association, Detroit, June, 1916.

1. Axenfeld: Ueber das Vorkommen von Netzhautablösung beim Hydrophthalmos, Klin. Med. f. Augenh., 1903, xli.

states that his is the first case in the literature in which this occurrence has been observed. Cases in which a gradual shrinkage and phthisis bulbi have occurred in hydrophthalmic eyes have been reported, though it had not been possible to determine the cause.

In finding a possible explanation, it is well to consider what becomes of glaucomatous eyes in general. Many of these remain hard, undergoing the well known degenerative changes. Others develop ectasias of the sclera and finally, according to Fuchs,² the termination of all glaucomas is a shrinkage of the eyeball which occurs after the eye has been hard for many years. Operations on eyes which have been in a state of increased tension for a long time frequently show a fluid vitreous, as is sometimes demonstrated during operation on these eyes.

It seems to me reasonable to assume, therefore, that in cases of hydrophthalmia the vitreous degenerates in the advanced stages of the glaucomatous process, and at a certain point or stage of degeneration conditions are present, sufficient to overcome the natural tendency of a glaucomatous eye against detachment, which produce a change from increased to decreased tension and a detachment of the retina.

The possibility of a spontaneous detachment of the retina should be considered before deciding to operate on advanced cases of hydrophthalmia.

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ABSTRACT OF DISCUSSION

DR. DON M. CAMPBELL, Detroit: I find little to discuss on the subject of detachment of the retina—hydrophthalmia. Very few cases are reported and none in the textbooks. There does not seem, however, to be any reason why we should not have detachment of the retina in the hydrophthalmic eye, except for the increased intra-ocular tension which would keep the retina closely applied to the underlying tissue. Dr. Knapp states that the possible detachment of the retina is bound up with the fluid vitreous and the change from the hard to the soft eye. It has occurred to me that the cause of the change of the eye from hard to soft may be the cause really of the detachment of the retina and also of the decreased tension. We can, I believe, only judge of this subject from analogy. There is no pathologic material, so far as I have been able to find, to cover the explanation of the passage of a hard eye to a soft one; but we do know that in these cases of buphthalmos or hydrophthalmos certain changes take place in the anterior segment of the eyeball which may take place in the posterior segment and may serve to explain the softening and detachment. We know that in anterior staphyloma the choroid and sclera gradually become thinner; that eventually at areas in the anterior staphyloma the sclera breaks through and disappears entirely. In a similar way we may have the same thing take place in the posterior part of the eyeball, although we have no observations of an anatomic character to bear that out. There is an analogous condition in the ciliary region in buphthalmos, a separation of the iris from the ciliary region, a condition which Fuchs refers to as a spontaneous dialysis. There is also in the cornea of buphthalmic eyes a certain anatomic condition which has been observed that offers another explanation of the possibility of a detachment of the retina. It has been found that in hydrophthalmic corneas there is a rupture of Descemet's membrane, therefore it is not at all unlikely that the retina, which is more delicate than the elastic membrane of the cornea, might also be the seat of minute ruptures from its distention. We have, then, these two possibilities resulting from analogy: There is a partial rupture of the sclera posteriorly, overlaid by a retina which has undergone minute rupture also, and when we add to those

the fluid vitreous, it is not a great flight of imagination to conceive at least that the fluid vitreous might find its way through the retinal tents and produce detachment in these hydrophthalmic eyes. It seems that a possible explanation of this spontaneous detachment would be along the lines, first, of a fluid vitreous; second, rupture of the sclera, or a sclera very much weakened behind the retina; and third, the slight ruptures which might occur in the retinal tissue from its extreme distention in these highly distended eyeballs. This is purely theoretical and cannot at the present time be substantiated by anatomic research. At the same time it does not seem to be an unusual explanation. Of course, there are comparatively few buphthalmic eyes in that condition long enough to be observed. The cornea on the lens become more or less hazy and we cannot observe the interior of the eye.

DR. T. B. HOLLOWAY, Philadelphia: Dr. Knapp's case well illustrates the contentions of Axenfeld, who believes that retinal detachment is often the determining factor in the production of blindness in cases of buphthalmos. Axenfeld has emphasized this point, and further states that the detachment is promptly followed by reduction in the ocular tension. In speaking of spontaneous cure in these cases, he believes this may be in certain instances hereditary. At the Overbrook School for the Blind I have under observation at the present time eight children who have been affected with buphthalmos, and some of these have been under observation for five or six years. The first case, which I think is probably the only one, had a retinal detachment. The patient was first seen in 1909, and in 1911 the detachment was observed. The difficulties in studying these advanced cases of buphthalmos will be appreciated when we recall the searching movements, so frequently present, the changes that develop in the cornea as the result of ruptures in Descemet's membrane, the development of cataractous changes, and possibly diffuse opacification of the cornea. In the cases at Overbrook School, several show marked decrease in tension in one or both eyes, and I can recall instances where the eye when first observed had increased tension, and then gradual and progressive decrease in tension developed with gradual atrophy of the eye.

A CASE OF CEREBROSPINAL SYPHILIS ASSOCIATED WITH PNEUMOCOCCIC MENINGITIS

E. M. HAMMES, M.D., ST. PAUL

Marked advances in the diagnosis of organic nervous diseases have been made in the past few years. This is in a great measure due to the careful and frequent studies of the spinal fluid in our obscure neurologic cases. The importance of Nonne's four tests, to which may be added a fifth, Lange's colloidal gold test, are demonstrated in the following case. The combination of cerebrospinal syphilis with pneumococcic meningitis seemed of sufficient interest for publication.

A woman, aged 21, single, domestic, with negative family and personal history, except for an appendectomy in 1911, stated that about two years ago she had a sore on her hand, which the doctor pronounced a gonorrheal infection. Syphilis was denied. The present complaint began about Jan. 10, 1915, when the patient developed an abscess on her right thumb which was very painful. This continued to suppurate slightly for one week, and January 17 the abscess was lanced and drained. The evening previous, the patient developed severe headaches and shortly afterward had a general convulsion. She had another one, January 18, and her headaches since then have been mostly frontal and bilateral.

I first saw her January 19, when she complained of severe frontal headaches, and appeared somewhat drowsy and confused. The physical and neurologic examination at this time were negative, except for an abscess on the right thumb which was draining freely. The temperature was around 100 F. for two days, and then gradually became normal and has remained so. The pulse varied between 75 and 100. Leukocytosis was 12,200; blood pressure 122 mm. Hg; urine normal.

2. Fuchs: *Lehrbuch der Augenheilkunde*, Ed. 10, p. 445.