

births, 10 per cent. in miscarriages, 16 per cent. died in early infancy, and 32 per cent. were hydrocephalic.

In a case reported by Mendel⁴¹ of a hydrocephalic child that died at 6 months, out of a family of eleven children not one survived, only one living to the age of a year, dying then of convulsions, the remainder dying within the first three months of their existence in convulsions or with choleraic symptoms. The father had had syphilis. In a case cited by Engelberg⁴⁸ of 14 children by a syphilitic father 9 died in infancy, one of hydrocephalus. Bärensprung⁴⁹ reports many postmortem examinations of hydrocephalic children of syphilitic parents.

What is it that induces in one case the concentration of the effect of the specific poison on the brain while another individual enjoys complete immunity from any cerebral implication? This is a problem to which no complete solution is at present possible. Interesting, however, in this connection are a number of cases in which the apparent initial phenomena have followed a blow or fall on the head. They are not so common that we may refuse to believe them more than coincidences, occurrences brought into the picture by the common tendency of the parent to attribute everything to an accident. Nevertheless they can not be entirely ignored. It may be that, in the one case, the brain by inherited or by acquired deficiency in vitality or in power of defense, becomes a *locus minoris resistentiæ*; while, in another instance, concussion by its circulatory and nutritive disturbances produces a similar condition. In several cases of the series on which this study is based, blows or falls on the head preceded the onset of the cerebral disease. It was noted also, among others, by Lallemand's⁵⁰ case, by Rul Ogez⁵⁰ and by Heubner⁵¹ in adults. Physical strain may be perhaps also occasionally a factor.

Virchow also noted the influence of external accidents on the localization of syphilis, and Heubner remarks that "if this is true of the skin, bones, etc., it may be assumed for the nervous system," and quotes Paracelsus to the effect that "syphilis takes, in every man, the character of that disease to which he is inclined by hereditary or other predisposition."

DISCUSSION.

DR. W. P. NORTHRUP, New York City, said that any one who has lived within the boundaries of a foundling hospital of a metropolitan district for 12 years knows how many such cases there are.

DR. WILLIAM J. BUTLER, Chicago, said that if recent articles on this subject serve to stimulate investigation and the reporting of bona fide cases, he is sure that cerebral syphilis will be found to occupy relatively quite as important a place in the pathology of brain lesions in children as it does in the adult. Its clinical manifestations form a picture that permits of as logical a diagnosis as it does at a later period of life. As Dr. Fairbanks pointed out, it may present itself clinically as an epilepsy, as a meningitis, with all the bizarre accompaniments of the specific basilar meningitis of the adult, as a cerebral palsy, with an onset and course reflecting in a convincing manner its specific etiology, as a progressive dementia with mental impairment, anarthria and focal paresis, and sometimes rigid pupils, as in a case he recently reported, leaving no doubt as to its cause. In the cerebral syphilis of children one usually finds some other evidence of hereditary syphilis, as an atrophic choroiditis, deafness, Hutchinson's teeth, etc., but the absence of these should not in any

instance dissuade one from a diagnosis any more than it would in the adult when we are not accustomed to depend on the statement of the patient nor the absence of external evidence of recent or old syphilitic lesions. And it is exactly in those cases in which the early manifestations were slight or went unobserved that the cerebral changes may develop in children. Its early recognition is of paramount importance from a prognostic standpoint, as the latter will of necessity depend chiefly on the promptness with which treatment is instituted.

SOME IMPORTANT CONSIDERATIONS IN THE EXTRACTION OF CATARACT.*

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Established methods of cataract extraction will be discussed in this paper only sufficiently to draw attention to certain of their important points and to compare them with those which I advocate. Soft or membranous cataracts or such others as some traumatic varieties, which do not require extraction, but needling, removal by capsulic punch, or other kind of operation, will not be considered.

When the lens is found to be opaque, judgment should determine, after examination, if it is necessary or wise to operate, and if so by which method. The field of vision should be taken, and this is best done by the use of a candle, or preferably two, whereby the field may be mapped out with tolerable certainty. The tension should always be determined. An examination of the urine sometimes gives suggestive hints as to the cause of the cataract, the presence of retinitis, and probable length of life. Herbert¹ rejects cases in which albuminuria is associated with edema. The general state of health should be inquired into, especially bronchial or asthmatic conditions, whether or not the patient can lie supine for a long time, and the position usually assumed in bed. Some patients can not lie on their backs and provision should be made for others so that they may be supported in bed. It is impossible here to dwell on all the detailed information which should be obtained regarding each patient and the many things that must be taken into consideration in determining the propriety of an operation.

Examination into details increases the confidence of the patient, but care should be exercised not to dwell too much on every little defect and thus promote nervousness and anxiety and make the patient refuse an operation, preferring blindness, or the useless treatment of some promising quack. The ophthalmic surgeon, more than any other, should obtain the hearty confidence of these introspective, nervous, blind, old people who are preparing for an operation on their most delicate organ.

I shall not enter into much discussion of the advisability of operation, but with others, e. g., Brudenell Carter² (Bulson³ very fully considers the advisability of operation), think that old patients, if unable to attend to their ordinary business because of uncomplicated cataract (not associated with any special disease), whether it be mature or not, should be operated on without too long waiting, since these patients, formerly active, often quickly decline and deteriorate in mind and body because of the enforced inactivity. This breakdown is es-

48. Engelberg: "Behrend's Syphilidologie," III, 1862, p. 37, etc.

49. Bärensprung: "Die hereditäre Syphilis," Berlin, 1864.

50. Heubner: Ziemssen's Encyclopedia, XII, p. 301.

51. Ueber die Hirnerkrankungen der Syphilitischen. Archiv für Heilkunde, XI, 1870, obs. 47.

* Read in the Section on Ophthalmology of the American Medical Association, at the Fifty-seventh Annual Session, June, 1906.

1. Herbert: "Cataract Extraction."

2. Carter: "Lectures on Cataract."

3. Bulson: THE JOURNAL A. M. A., Sept. 23, 1905.

pecially marked in the cardiovascular system which, in turn, affects the kidneys and other organs with end arteries. A little red reflex or the presence of transparent cortex do not deter me from operating, provided that the vision of neither eye is sufficient for the patient's needs, that the cataract is slowly progressive, that the field of projection is good, and that there is no suspicion of serious intraocular disease, e. g., beginning retinal detachment or the various forms of serious choroidoretinitis. Granting that mild iritis is more common and that an operation for secondary cataract is more often required after operating on immature cataracts, is it not even then better to do so than to keep the patient waiting months and sometimes years? The final results should be as good as after the extraction of mature cataract, and vision is restored much sooner, thus aiding the general health. Having determined that an extraction operation is feasible and advisable, the patient should be impressed with the necessity of as strict antiseptic and aseptic precautions as are possible. He should be made to know that his assistance in keeping quiet and in properly turning the eyes is necessary to obtain a good result; in short, he must be ready to do his part. Unless exceptionally intelligent, he may not appreciate the importance of going to a hospital instead of having the operation performed in a private house, and the dangers should be fully explained to him.

If chronic inflammation of the conjunctiva is present, treatment should be instituted to cure the discharge before subjecting the patient to the danger of infection after operation. A test bandage may be placed over the eye for several hours and the discharge, if any be present, examined microscopically. If pus is discharged into the eye sac from the lachrymal sac and the diseased condition can not be cured, or time and circumstances will not permit, the puncta may be obliterated by cauterization or the canaliculus closed by a ligature, just before operating, as recommended by Knapp.⁴ If time permits, an operation obliterating the lachrymal sac is often justifiable in these cases. Gifford⁵ slits the upper tear points and injects some indifferent solution in cases seen several days before operation.

For one week before the operation I have the patient wash the eye by means of an eye bath three times a day with some sterile solution, such as saturated solution of boric acid in distilled water or normal saline solution. Eye baths or eye cups if kept scrupulously clean, being frequently boiled and always thoroughly washed and dried before using, are very serviceable. Patients are shown how to use the eye bath and are also given the following printed instructions:

"The eye bath about one-third full of the solution, should be gently pressed against the closed eyelids while the head is slightly inclined forward. The head is then slowly thrown backward, the lids are opened and closed repeatedly, and the eye bath moved slightly from side to side, during sufficient time to count to 30 or 40, so that the solution may completely wash out the eye sac. The head is then again inclined forward when the eye bath is removed (the eyelids remaining closed for a few moments), and its contents, which should be used for one eye only, thrown away."

By this means the eye sac is mechanically and thoroughly cleansed with less irritation and with a greater degree of comfort than by any other. The bath is also used on the morning of the operation and about one hour before operating, after which a sterile eye pad is fastened by strips of adhesive plaster over the eye.

The nose should also be sprayed two or three times before operating with a slightly antiseptic solution. Lippincott⁶ suggests spraying the nasal cavities with a 1 to 2000 potassium permanganate solution. On the evening of the second day before the operation a large dose of some cathartic should be prescribed, and in certain cases a large enema given in order that the bowels may be locked for one or two days after operation so as to disturb the patient as little as possible. All the hair on the head should be washed the night before the operation, particularly the eye-brows and eye-lashes. In certain cases I express the contents of the glands and ducts on the edge of the lids by gently stripping these margins between the finger on the skin and a smooth glass rod on the conjunctival surface. Sometimes this should be done on several days and in some cases a mild sterile ointment should be applied. Great care is exercised in preparing the field of operation, and I think only unirritating solutions, such as boric acid, normal saline solution, etc., should be used. The skin surfaces about the eye should be thoroughly cleansed, and the surgeon himself or some skilled assistant should then cleanse the conjunctival sac as thoroughly as possible. This may best be done by pressing the solution from pledgets of cotton, sometimes by gently and carefully wiping the conjunctiva of the lids with the moistened cotton, avoiding the slightest injury to the cornea. The hair and scalp should be covered with either a rubber bath cap or towel which has been kept in an antiseptic solution. Other sterile towels, preferably dry, are laid over the neck and chest of the patient extending to the chin, but not above the mouth, as the patient's breath would then be thrown directly into the eyes.

Since micro-organisms (*Streptococcus* and *Staphylococcus pyogenes* and *Pneumococcus*) normally abound in the saliva of both patient and operator, infection from this source should be given consideration. G. Hotta⁷ states that infection occurs without fail if the saliva is brought into pocket wounds of the cornea and is likely to occur if there is impeded drainage of the tears from an affection of the lachrymal passages. The patient's and surgeon's mouths may be rinsed out with an antiseptic solution before the commencement of an operation.

Instead of directing the patient's breath toward his eyes by means of a towel placed over the mouth and nose, which should never be done, I have his breath directed away from the eyeball by a small screen made in the following way: A strip of adhesive three or four inches wide and six or seven inches long is covered with gauze on its adhesive side, with the exception of about one-half an inch of its width along one margin, throughout its entire length. By this upper uncovered margin it is fastened across the bridge of the nose and both cheeks an inch or more below the eyes, so that it hangs down over the nose and mouth and directs the patient's breath and saliva away from his eye. It should next be covered with sterile gauze.

If the operator is suffering from coryza, cough or affections of the mouth, or if compelled to speak much and loudly, as when teaching, Hotta⁷ believes a veil of gauze is advisable. Axenfeld, Haab, Mayweg, Blaschek, Kuhnt, Flügge, Eversbusch and Hansell⁸ also favor mouth veils. Harold Gifford⁵ describes a gauze covering for the nose, mouth, beard and hair, which also prevents dandruff from falling directly on the operative field, as being very essential. The scalp

4. Knapp, Norris and Oliver: "System of Diseases of the Eye," vol. iii, p. 896.

5. Gifford: Trans. A. M. A., 1903, p. 150.

6. Lippincott: THE JOURNAL A. M. A., 1900, p. 930.

7. Hotta: Klin. Mon. fuer Aug., 1905, vol. II, p. 237.

8. Hansell: Annals of Ophth., April, 1905

and hair of every surgeon should always be covered by a gauze cap. I have made a simple spectacle-shaped appliance that lies below the surgeon's spectacles, if he wears any, over the bridge of the nose and on the cheeks, and is supported by strong temples over the ears. A strip of gauze about one yard long may be drawn over this frame so that the ends meet below. The lower ends of these strips for a distance of ten or twelve inches are then split by scissors and the two halves, one on each side, tied or fastened by a safety pin behind the neck so that the gauze hangs over the mouth and passes over the chin around the neck. As many layers of the gauze may be used as are thought to be necessary. With this appliance the surgeon's breath will not pass upward into his own eyes or blur his lenses, but pass out to the side, and all saliva or excretions from the nose will be arrested in the gauze and he can still talk and breathe freely.

The confidence of the patient is increased by careful attention to every detail. A little previous instruction as to his own behavior, how to turn the eyes downward and sometimes also a little outward, is very helpful. In particularly nervous individuals I sometimes introduce the speculum in the eye under cocain anesthesia at my office or some time before operation and explain to them how to hold and how to turn the eye up, down, to the right and left, and thus permit them to become accustomed to it. Herbert¹ of India insists on carefully training the patient. Many a blind patient can easily direct the eyes downward toward his own uplifted hand. Sometimes I hold instruments about the patient's face and touch the eye, pretending that I am operating, until the patient being assured that I am nearly through becomes quiet, then I commence to operate. I have never been detected in this ruse.

I usually sterilize my instruments by boiling them from five to ten minutes, those with cutting edges being wrapped in cotton, and then place them in a sterile solution contained in a shallow tray, the bottom of which is covered with a few layers of sterile gauze to keep the instruments from coming in contact with each other.

In addition to about six instillations of 4 per cent. sterile cocain solution, a minute or two between each instillation, the lids remaining closed to prevent drying of the corneal epithelium, I inject a few minims of a sterile adrenalin and cocain solution with a sterilized, aseptic, all metal, solid-plunger, hypodermic syringe under the limbus conjunctivæ where I intend to enter the Graefe knife in commencing the section, and also in the opposite limbus where the point of the knife is expected to exit from the anterior chamber. This adrenalin and cocain solution is prepared by placing a hypodermic tablet of adrenalin and cocain in fifteen minims of distilled water which is boiled for two or three minutes. This gives a sterile solution of approximately 1 per cent. cocain and 1/4500 adrenalin. This assists me in commencing a large conjunctival flap, which I believe should extend three or four mm. beyond every portion of the corneal flap and not merely from eight to ten mm. at its upper margin as made by others, e. g., Clarke.⁹ The adrenalin greatly checks bleeding under the flap, which should be folded back on the cornea at once to prevent the blood from being forced into the anterior chamber. I recently learned for the first time that Koller and H. Gifford¹⁰ had made subconjunctival injections of cocain at the limbus, and that Gifford formerly made large conjunctival flaps. In the same paper he states that he abandoned this hypodermic method of using cocain be-

cause the artificial edema of the flap prevented ready coaptation, and he also advocates a small conjunctival flap. I have always used the adrenalin and cocain together and find that the flap adheres very readily and strongly, not being edematous. It seems that the trifling disadvantages of this large conjunctival flap, viz., hemorrhage, care of folding it on the cornea when it partially obscures the iris, and rarely filtration edema, are far outbalanced by its great advantages, since it speedily becomes agglutinated to the raw surface on the sclera closing the wound externally and sealing it, and thus aids in the accurate coaptation, and smooth and speedy healing of the scleral and corneal wound margins with lessened postoperative astigmatism, and comparative immunity from after infection, incarceration, or iris prolapse.

The knife is first entered into the temporal conjunctival bleb produced by the subconjunctival injection of the cocain and adrenalin solution three or four mm. or more from the sclerocorneal junction. After passing through the bleb the point of the knife is directed toward the center of the eye so as not to get between the lamellæ of the cornea, and when it has opened the anterior chamber some of the cocain enters and renders the anesthesia more profound. The knife is passed across the chamber and through the opposite corneoscleral junction into the other conjunctival bleb. I then make a large section in the corneoscleral junction, including nearly the upper half of the cornea, with a very large completely-bordering conjunctival flap. A small section strips the cortex from the lens, rendering the delivery of the latter difficult, requiring greater force, entangling the iris, and bruising it and the lips of the incision between which latter cortical débris is likely to be retained, thus giving a starting point for infection.

In some patients with shallow anterior chamber, in order not to scalp the iris, it is better to make a smaller section at the corneoscleral junction than the one described, and to enlarge it to the required dimensions by strong blunt-pointed scissors. If there is a deep anterior chamber the conjunctiva may be raised without the use of the hypodermic at the point of exit of the knife, so as to obtain a conjunctival flap by waiting a moment after the knife has passed through the cornea and sclera, or sometimes by slightly turning the knife so as to permit a slight amount of aqueous to flow out under the conjunctiva (Brudenell Carter²). The use of the hypodermic is to be preferred to this method, in which too much aqueous might escape, and the iris, falling over the knife, might be scalped and a portion of it sacrificed. It is easy to get a large conjunctival flap when started correctly with the above-mentioned precautions, if the section lies clearly in the corneoscleral junction and not as usual in the cornea. It should be remembered that in front at this junction the sclera slightly overlaps the cornea, and such sections should include not only a little of the cornea internally, but also some of the sclera externally, and must do the latter in order to have a conjunctival flap. This is not identical with the purely scleral section described by Fuchs.¹¹

In making the incision it is well to have the patient look downward and a little outward so as to give the point of the knife greater freedom of movement without sticking into the inner ends of the lids. Care should also be taken that no portion of the blade which has once touched the lid margin be allowed to enter the section. The cross-bar of the speculum should be well

9. Clarke: *Ophthalmology*, July, 1905.

10. Gifford: *Am. Jour. Ophth.*, November, 1904.

11. Fuchs: "*Text-book of Ophthalmology*," p. 695.

down against the cheek, as in my adjustable speculum.¹² The speculum described by Beard¹³ is also excellent, since it can be bent so as to place the cross-bar on the cheek. Each one has much the same old style of solid lid holders which will not catch the corneal section on removal or permit the contents of the glands in the margins of the lids to be deposited on the section. I think that when the section is made in the junction between cornea and sclera, although there is greater hemorrhage, it is to be preferred to one made in the cornea only, for the following reasons:

1. Since there is a good blood supply at the limbus, healing will be more rapid than in the bloodless cornea.

2. A conjunctival flap with all its advantages may be obtained which can not be done in a purely corneal section.

3. A section within the cornea will usually be smaller and therefore scrape more cortex from the lens and will have its margins more severely wounded than will the larger section in the sclerocorneal junction.

4. The more peripheral location of the wound is an advantage in delivering the lens, as it has to turn less on its axis.

5. Tags of capsule, etc., are not so liable to be incarcerated in a peripheral section, since it is farther from the pupillary area and heals much more promptly with less escape of aqueous, being protected by the conjunctival flap. The danger of prolapse of the iris, which on first thought might seem to be increased, is lessened.

6. The less peripheral the incision the higher is the degree of postoperative astigmatism (Majewski¹⁴).

After instilling another drop of cocain the conjunctival flap, by means of a spatula, should be carefully folded back on the cornea (the larger the flap the more easily this is done and the better it remains) else it would subsequently be in the way and possibly might be cut off. This folding back of the flap on the cornea should be done as soon as possible after the section is completed, as otherwise blood might be forced into the anterior chamber. If there is some hemorrhage from the conjunctiva a few drops of adrenalin should be instilled and nothing further done for a few moments until all the bleeding has ceased.

After telling the patient to expect a little momentary pain and cautioning him quietly and gently to keep looking downward, both eyes open, without any tension or squeezing and to keep his hands open and not set the jaws, I pass an iris forceps, with small teeth only on the lower back edge and not on the end, into the anterior chamber. The forceps grasps the iris a very little beyond the middle of its anterior surface and never at or near the pupillary margin, as is generally advised in all the literature at my command, when any specific instruction is given. The iris is then withdrawn folded on itself, until the pupillary edge lies just outside the corneoscleral incision. By grasping the iris as described its whole width may be withdrawn from the eye with only one-half the traction and correspondingly less pain and tearing of the iris tissue than if it be grasped at or near its pupillary margin. The iris should be pulled no more than is absolutely necessary, so as to wound this delicate nervous structure the least possible and thus reduce pain, exudation and hemorrhage. For example, it can be readily understood that if the iris is four mm. in width and it be grasped at the pupillary margin, this margin would have to be drawn eight mm. from its orig-

inal position in order to have the whole width of the iris outside the incision. If the iris be grasped at the middle as described the forceps would need to be withdrawn only four mm. and the pupillary margin would be stretched only four mm. from its original position instead of eight mm. as in the other method, one-half as far, only one-half as much traction, and less than one-half as much tearing and injury. By means of a sharp pair of strabismus or other scissors held alongside and parallel to the forceps, the folded iris tissue is cut through with one snip in the vertical meridian from pupillary edge to outer periphery, a true sphincterotomy and iridotomy, but not an iridectomy, since no iris tissue is removed. Properly speaking, sphincterotomy means division of the sphincter only, but I prefer to use it in this wider sense, since the term iridotomy, although more proper, has been already used for a different operation and would be likely to give rise to confusion. I have been performing sphincterotomy for some time, and until the preparation of this paper believed it to be a new method. I recently found that Williams¹⁵ in 1881 and Meyer¹⁶ in 1887 incidentally referred to it, each, however, in only a part of one sentence.

I think the general consensus of opinion, even though contrary to that of many distinguished surgeons, is that a combined operation is usually preferable to simple extraction, especially in complicated cataracts or those with posterior synechia or rigid pupils, in that there is less danger of subsequent iris prolapse or incarceration, less tearing of the iris tissue in general, and less retention of cortical matter because of less stripping of the lens by the divided sphincter; and also because less pressure is required to expel the lens through the enlarged pupil.

Preliminary iridectomy or sphincterectomy seems to give excellent results, but it exposes the patient to the dangers of infection through two operations requiring the opening of the eyeball. It does not seem that the facility of removal is increased sufficiently to warrant the extra risk, loss of time, expense and trouble to the patient. Objections urged against the combined operation are that it mutilates the iris and furnishes a focus for infection, that the light entering the larger pupil dazzles the patient and is not so perfectly focused as that passing through a small pupil. I do not wish, however, to thrust myself out on this common battlefield.

Dividing the sphincter and width of the iris before attempting delivery of the lens merits consideration for the following reasons:

1. If they are completely divided less resistance will be offered by the sphincter and iris to prevent the escape of the lens from behind them, so that less pressure will be required to deliver the lens and consequently less tension is placed on the suspensory ligament, and there is less tendency to prolapse of vitreous.

2. Since the iris is cut completely through, the anterior support to the upper margin of the lens opposite the section is greatly reduced, so that the upper margin may be more readily tilted forward and pass out of the eye without so much chance of turning over or other accidents.

3. Because of the large opening through which the lens may pass, there will not be nearly as much stretching or rupturing of the other portions of the pupillary margin and iris tissue, and not as much subsequent exudation, even though there might be more exudate and

12. Stevenson: *Ophthalmic Record*, April, 1904.

13. Beard: *Ophthalmic Record*, January, 1905.

14. Majewski: *Annals d'Oculistique*, vol. cxxvi, 99.

15. Williams: "Diseases of the Eye."

16. Meyer: "Diseases of the Eye."

hemorrhage just after making the incision in the iris. At this time, however, blood or exudate can always be washed out of the eye by the irrigator. The more tears or ruptures in the pupillary margin of the iris, the greater the number of posterior synechiæ which subsequently form between the torn iris and capsule.

4. The margins of the larger opening through which the lens may be passed do not strip the cortical matter from the lens mass and retain it as does an undivided sphincter. The coloboma furnishes a sluice way through which the soft cortical matter may be readily removed (Bulson⁸).

5. Thickened, inelastic, flabby irides unless incised, are much stretched and torn, and are more prone to remain outside the section, or later to prolapse because they are pressed into a funnel shape during the exit of the lens.

6. Free division of the iris establishes easy and continuous passage for the fluid between the anterior and posterior chambers, even to the periphery. When the iris and sphincter are undivided the fluid is said to collect in the posterior chamber, especially behind the peripheral portion of the iris, and if the corneal section should suddenly open because of some sudden pressure of the eye muscles or other cause, e. g., coughing in chronic bronchitis, this pent up fluid is liable to prolapse the unsupported iris in its rush to escape from the eyeball.

7. It is easier to replace the divided iris within the section at the time of operation (a) because of the free connection between the anterior and posterior chambers; (b) the sphincter divided in only one place is stronger than when torn in many; (c) the body of the iris and sphincter is not thickened so much by exudation and hemorrhage; (d) the elasticity of the structure has not been destroyed to the same extent.

8. There can not be as strong a tendency to the development of postoperative glaucoma.

I think that iridotomy or sphincterotomy is preferable to iridectomy or sphincterectomy for the following reasons:

1. The operation is easier and simpler to perform, consisting of one simple straight snip of the scissors held at right angles to the surface of the cornea.

2. The total length of the cut iris is less on account of the long U-shape of the iridectomy incision from which there is greater exudation and hemorrhage. The cut going directly to the periphery is also in a better position within the eye than a mere sphincterectomy.

3. Iridectomies as done before cataract extraction are usually not peripheral, and the peripheral portion of the iris tends to retain the lens, and afterward the fluid, behind it. When the incision extends through the width of the iris the lens and fluid are not retained behind it.

4. The coloboma is much narrower, a mere slit peripherally, than in an iridectomy and being altogether or almost covered by the upper lid, the patient is not subsequently dazzled so much by the light as after an iridectomy which leaves a broader coloboma.

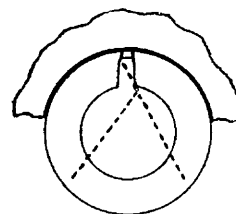
5. The shape and size of the coloboma, particularly the sharp edges at the pupillary margins, are well known, so that when the toilet of the eye is made it can be readily seen when the iris is completely within the eye. It is not always possible to know the exact size and shape of the piece of iris removed in an iridectomy, thus making it a little more difficult to know when the iris is properly straightened out within the eye.

Macnamara¹⁷ in 1882 advocated the excision of a small peripheral piece of iris leaving the sphincter intact. Dr. Taylor of Nottingham removed a sufficiently large peripheral piece of iris to permit the egress of the lens. H. B. Chandler¹⁸ reports 312 cases of cataract extraction with a small peripheral buttonhole in the iris. This latter method is no doubt better than a simple extraction, as the fluid can more readily pass from one chamber to another, and will not be so liable to dam up behind the iris and to cause its prolapse on sudden escape of fluid through the section. Since the buttonhole (if not made too large) will be covered by the upper lid after operation, there will be no apparent deformity of the iris due to the artificial coloboma as after iridectomy or sphincterotomy. I think, however, that sphincterotomy is to be preferred to this small peripheral buttonhole in the iris for the following reasons:

1. Without any personal experience with the latter, I should think it somewhat more difficult to do, even if the iris would need to be withdrawn less, since care would have to be exercised, not to make the opening too large and so have the lens pass through it instead of through the pupil, or such that it would catch and hold the edge of the lens. Some operators make the buttonhole after the expulsion of the lens.

2. There would not be such free communication between the chambers, and correspondingly greater danger of subsequent iris prolapse.

3. The sphincter being intact, this operation is open to most of the objections raised against the simple opera-



This diagram represents position and size of the conjunctival flap, position of section in corneoscleral junction, and narrow coloboma after sphincterotomy, the dotted lines representing the two incisions in the capsule; the angular flaps, which curl up, lie on either side of the short dotted line; the lower flap having the sharper angle curls more out of the way than the other.

tion, e. g., stripping of the cortical substance from the lens, stretching and tearing of the sphincter and adjacent iris, increased hemorrhage, exudation and thickening, greater force required to expel the lens, with consequent greater danger to the suspensory ligament, prolapse of vitreous, etc.

The next step in the operation is to perform a simple but efficient capsulotomy. The varieties of capsulotomy described are legion, but most of them are more or less impracticable because difficult, and some are even impossible to perform. It is more or less difficult to make horizontal incisions in the capsule and considerable dexterity is required to make some of the combinations of incisions described. A few operators, DeWecker, Eugene Smith,¹⁹ remove a portion of the anterior capsule by means of capsule forceps. Knapp²⁰ states that dislocation of the lens with prolapse of the vitreous and its consequences are not unlikely accidents in removing the anterior capsule. Others follow Pagenstecher's method and remove the lens within the capsule. The

17. Macnamara: "Diseases of the Eye."

18. Chandler: Archives of Ophthalmology, January, 1904.

19. Smith: THE JOURNAL A. M. A., Sept. 26, 1891; also Am. Jour. Ophth., November, 1904.

20. Knapp: Am. Jour. Ophth., September, 1905.

anterior capsule may be so incised without removal that it will not obstruct the pupillary area or have anything to do with secondary cataract in this area, although, as in every method, some cortical matter is retained in the peripheral areas. Secondary cataract in the peripheral area is sometimes useful by partially blocking the entrance of light into the coloboma. Of course the posterior capsule is the one chiefly concerned in the production of secondary cataract in the pupillary area; deposits in the form of "pupillary membranes" sometimes form on the front of this capsule. A good sharp cystotome is necessary so that but two cuts will be needed in making the two incisions. More are unnecessary and will even be harmful, since then small strips of capsule are liable to lie in the corneal section preventing prompt healing, and therefore exposing the eye to greater danger of infection. The cystotome I use has no sharp points to catch anything; it has a blunt end so as not to injure the iris when pushed up under it, and a cutting knife edge that will cut either way and may be easily sharpened. The instrument is passed with its cutting edge backward, across the anterior chamber and for some distance under the distal portion of the iris, toward either side, usually the nasal. One straight cut is then made across the whole lens passing through the pupillary area about 1 mm. from the pupillary edge of the iris and into the coloboma made by the sphincterotomy so that this incision extends as nearly as possible throughout the whole anterior capsule, and not merely in its pupillary portion. If the peripheral portions which are thinnest are not cut, cortical masses are more liable to be retained within the capsule, and greater force is required to remove the lens from its capsule. The cystotome is then again passed under the distal portion of the iris, but on a different side from the one chosen before, and a second cut is made passing more nearly to the center of the pupillary space, and meeting the first incision at the beginning of the coloboma or proximal pupillary margin. This method of doing a capsulotomy is worthy of attention for the following reasons:

1. It is simple and easy to do.
2. There are no strips or tags of capsule that can possibly get into the corneal wound, especially if the incisions are so large and peripheral that the capsule will not be torn by the exit of the lens. Promiscuous and extensive laceration of the capsule is harmful because tags of capsule are sure to lie in the section and retard or prevent healing, causing an uneven irritable scar which may help later to cause iritis, especially as there will also be more posterior synechia.
3. The flaps of capsule will tend to roll up out of the pupillary area. The sharper the angle of the flap the farther it will roll out of the way; this has been considered in locating the position of the incisions. The thin sharp flap from below will roll considerably downward out of the way. The lateral flap will roll somewhat to the side and out of the pupillary area and the largest portion on the other side of the first straight incision will also retract slightly out of this area (some might prefer to divide this last portion by another oblique and similar incision). While all the flaps of capsule will retract from the pupillary area, none of them are so situated that they can get into the corneal wound.

After capsulotomy is completed the next step is to expel the lens. This is done in the usual fashion by making pressure toward the center of the eye by a spoon or spatula over the lower limbus, while another spatula very gently depresses the sclera at the corneoscleral

junction. After the lens has passed one-half way through the section the lower spatula should follow it with less pressure on the eyeball. A very little stroking of the cornea may be indulged in to remove some of the larger particles of the cortical substance, but with many operators, I believe, it is usually better to use, with proper precautions, intraocular irrigation in removing blood, exudates, or cortical substance from the interior of the eye, and for this purpose, I prefer to use gently a slightly warm sterile boric acid or normal saline solution in a properly constructed gravity syringe. Great care should be used to prevent the retention of quantities of solutions within the eye sac.

This question of irrigation or lavage has been fully dealt with in many excellent papers by Reik,²¹ Beard,²² Bulson,³ and Lippincott,²³ and does not need further commendation or elucidation here. I think that after its use, which should not be continued too long, capsular opacities are less frequent or at least less dense, so that secondary operations are not so frequently necessary. By its use, except in some sclerotic cases with no lens debris when it is not required, we can obtain a more nearly perfect technic and secure striking, often brilliant results. The patient is usually much encouraged by the better vision after syringing out the lenticular debris, and is stimulated to do his part toward obtaining a happy result. After the use of the irrigator the iris seems to contract better and sometimes assumes its proper position without any manipulation. McKeown claims that the tendency to subsequent prolapse of the iris is lessened, and this should be expected since retained cortical masses by their swelling tend to increase tension and possibly prevent smooth healing and coaptation of the wound margins. Since there is more complete elimination of debris and speedier closure of the sclerocorneal section, and since if micro-organisms have entered the eyeball, many of them will be washed out, sometimes so diminishing their number as to render them harmless, inflammation and infection are less liable to result. When the anterior chamber remains empty and the cornea shrunken, the corneal dome may be re-established and the lips of the incision brought into correct apposition, aiding rapid healing and restoring corneal curvature. It should sometimes be used to remove blood from the eye during the operation as after sphincterotomy and before capsulotomy is done.

After irrigation the toilet of the eye is completed. If the iris is not in its proper position as shown by a sharply defined coloboma, especially at its pupillary corners, a spatula should be used to place it in a correct position and to reduce the tags of capsule lying in the wound. I have always been able to do this without any difficulty, but it is possible that rarely a case might be found in which an iridectomy might be necessary if the iris could not be properly replaced within the eye. Next after a little mild irrigation of the incision, the conjunctival flap is gently folded back into position by a spatula, and smoothed out. Its surfaces are usually sticky and it readily and strongly adheres, undoubtedly assisting in the accurate coaptation of the lips of the incision which, therefore, heal more quickly and make infection correspondingly less likely. Dr. C. F. Clarke⁹ claims that a conjunctival flap diminishes the amount of subsequent astigmatism. Earnest F. Maddox²⁴ advocates suturing the conjunctival flap. I doubt the pro-

21. Reik: *Annals of Ophth.*, July, 1903.

22. Beard: *Ophthalmic Record*, April, 1905.

23. Lippincott: *Ophthalmology*, January, 1906.

24. Maddox: *Ophthalmoscope*, November, 1904.

priety of prolonging the operation by this procedure, not only because the flap adheres so strongly without suturing, but also because, as Melville Black²⁵ has pointed out, the eye must be prepared, anesthetized, and a speculum introduced in order to remove the sutures which also beget infection. Kalt proposed a corneal stitch inserted like a Lembert intestinal suture, before operation, the central loop being long and drawn out of the way during the operation, after the completion of which the ends are drawn taut and tied.

Finally, I usually instil one drop of one-half per cent. of eserin sulphate into the eye, as this amount will not irritate and will cause the sphincter to contract slightly and for some time, so that the iris will be less likely to prolapse. Fuchs,¹¹ Gibbons,²⁶ Jackson,²⁷ and many other authorities state that eserin lessens the danger of iris prolapse. Before the pupil dilates again some remnants of cortex or capsule in the pupillary space may become attached to the iris, and when the pupil dilates be drawn from the central pupillary area. A dry, sterile, double eye pad, made by sandwiching a little sterile absorbent cotton between a few layers of sterile gauze, is then lightly fastened usually over both eyes by strips of adhesive, which latter are not so easily disturbed during restlessness as a roller bandage, and which may be cut in removing the pad for the first few days.

In order that no pressure may be made on the eyelid of the eye operated on, the strips are placed over the margins of the eye pad and do not directly overlie this eyeball. For the first day or so they are tightly placed over the pad covering the eye not operated on, making some pressure and thus tending to prevent the opening of the eyelids. A dressing on both eyes sometimes causes mental depression or excitement in old people. For the first few days it is well to cover the eyes for protection with some style of ocular mask or shield, such as Ring's mask, being careful not to make thereby any pressure on the dressing or lids. I have not had any experience with the so-called open method of treating these cases advocated by Fuchs and other distinguished ophthalmologists, especially those abroad, who claim smoother and speedier healing with less frequent hernia of the iris.

Undoubtedly, postoperative astigmatism is influenced by a conjunctival flap, the size and location of the section, the sharpness of the knife, or by anything which influences healing, e. g., prolapse or incarceration of the iris, swelling or cortical debris, presence of capsule tags in the wound, muscular action of the lids and eye muscles, and especially by any pressure made by the lids on the eyeball due to the tension of the lids, and particularly that due to pressure from dressings and bandages. The pressure of the lids can not be diminished unless possibly by antispasmodics, but care can be exercised that little or no pressure is made on them. It can be readily understood, for example, that if the section lies in the upper corneoscleral junction, any pressure on the cornea would make the upper flap of the cornea slide upward, overriding the adjacent sclera. This would make the vertical meridian less curved, not only because the cornea in this meridian has become flattened but also because the upper edge of the cornea has been displaced forward on the sclera.

The cornea being a stiff structure, if it lengthens in one direction it must necessarily shorten in another, and this latter is what takes place in the horizontal

meridian. Also the pressure made on the sclera, which projects forward in the rounding shape of the globe, pushes it backward and brings those anterior portions in the horizontal meridian closer together. Thus the curvature in the horizontal meridian is increased. Pressure on the sclera in the vertical meridian affects the limbus in this meridian exactly as in the horizontal, but the cornea and sclera not being joined together, the sclera merely slips under the cornea and does not pull the corneal margin with it as it does in the horizontal. The flattening in the vertical and increase of curvature in the horizontal meridian, are exactly what takes place after section of the eyeball above, and I think the chief cause is the degree of pressure made by the lids and by different dressings, which latter should be dispensed with at the earliest possible moment consistent with safety. The axis of the correcting cylinder is usually nearly parallel to a line joining the points of puncture and counterpuncture.

AFTER TREATMENT.

The patient is gently conveyed (carried) to his bed with as little muscular effort on his part as possible. The eye is inspected at the end of twenty-four hours and redressed with usually a single eye pad. This is done each day as long as necessary; the time varies from two or three days to a week or longer. In making these dressings I use only sterile normal saline or boric acid solutions, and never instill any collyria unless specifically indicated, as atropin in iritis, a mild form of which is nearly always present. After the use of a few drops of cocain several operators (Bulson⁴) when the wound has been securely closed for five or more days, instill three or four times a day for a period of four days, first a 5 per cent. and later a stronger solution of dionin, claiming that it increases the effect of atropin, assists in the treatment of iritis, and promotes the absorption of exudates in those cases which are at all affected by the drug. I have several times used a 5 per cent. solution of dionin as early as the third day without doing any harm, but am unable to state whether or not it was of any value.

The quiet of the patient for the first day or two is especially important. All physical exertion, coughing, vomiting, and hiccoughing should be guarded against. The patient should be made as comfortable as possible, should be informed about his surroundings and impressed with the necessity of quiet. For one day it is best, if possible, to have the patient lie quietly on his back or on the side opposite the eye operated on, without turning, and to permit movement of the arms and legs only. When necessary, the head may be made comfortable by the nurse, and after the first day the patient may turn in bed, if assisted by the nurse. I advise fluid or soft diet for at least two days, locked bowels for one or two days, and afterward, if necessary to prevent straining at stool, the use of mild laxatives and enemata. To reduce the discomfort following the normal amount of reaction and to diminish the pressure of the lids on the eyeball, I think it is well when not contraindicated for some particular reason and when it has been used previously without evil results, to give a hypodermic injection of morphia sulphate $\frac{1}{8}$ or $\frac{1}{4}$ gr. one hour before operating, which may be repeated every 3 or 4 hours if considerable discomfort continues. Dr. Eugene Smith²⁸ advises morphin hypodermically immediately after the operation because of its sedative and myotic action. The first

25. Black: *Ophthalmic Record*, February, 1905.

26. Gibbons: "The Eye, Its Refraction and Diseases."

27. Jackson: *Philadelphia Med. Jour.*, May 11, 1901.

28. Smith: *Knapp's Archives*, 1894, p. 85; also, *Am. Jour. Ophth.*, November, 1904.

night, if the patient is restless and can not sleep, a dose of some hypnotic may be given at bedtime. After explaining the reasons for it, it is sometimes advisable to tie the patient's hands to the foot of the bed by long strings, strong enough to wake him if any effort is made to reach the face, but not so strong as to frighten him by making him wonder what he would do in an emergency, such as fire. A simple way is to fasten the sleeves of the night gown to the bed clothes by small safety pins.

In conclusion, I wish to direct attention to the necessity of thorough examination and preparation of the patient, to the screens for the patient's and operators' breath and saliva, to the large, completely bordering conjunctival flap which is easily folded on the cornea, the method of obtaining it, the position and size of the sclerocorneal incision, where to grasp the iris when withdrawing it, the sphincterotomy and its advantages, the simple but efficient capsulotomy, the necessity of avoiding pressure on the lids and eyeball by the dressing, and the simple after treatment.

CATARACT EXTRACTION WITH MODIFIED IRIDOTOMY.*

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The following operation seems to possess advantages not offered by any other method of cataract extraction. While thus far it has been performed in only a few cases, it has given satisfactory results in all. More extended experience with it may, of course, bring to light unforeseen objections, but this is not anticipated.

THE OPERATION.

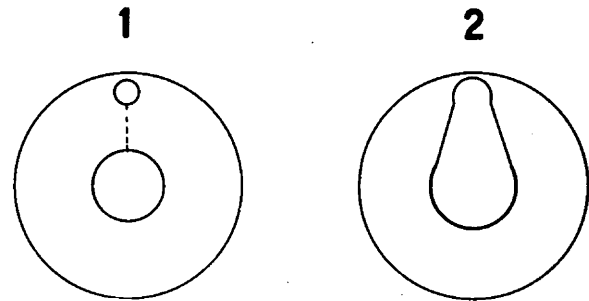
The corneal incision is made in the usual manner, probably best at the limbus. The iris is then grasped with the iris forceps as near its root as possible and a small bit of tissue excised with scissors so as to leave a small hole in it (Fig. 1). The iris will immediately return to the anterior chamber of its own accord. De Wecker's small iris scissors, preferably with blunt pointed blades (Noyes' scissors will probably serve as well), are then introduced through the corneal incision, gently opened, and one blade passed downward through the hole in the iris until it projects below the pupillary margin. The blades are then quickly closed, thus making a clean cut through the iris to the pupil. Owing to the mydriasis produced by the cocain, the edges of the incision will separate, usually at once, as widely as after an ordinary iridectomy (Fig. 2). If, however, the iris is pressed against the cornea by the lens, this may not happen until after the lens has been extracted. The lens capsule may now be opened with the cystotome or capsule forceps and the lens expressed in the usual way, or the latter may be extracted in its capsule. In making the toilette of the wound care should be taken, as after an iridectomy, to free the pillars of the coloboma from the incision. It is probably best to instil atropin immediately after the operation, since this enlarges the coloboma and thus lessens the danger of iris prolapse.

ITS ADVANTAGES.

This operation offers the advantages of both the simple and combined operations without their disadvan-

tages. The lens is removed with the same ease as in the combined operation, the danger of iris prolapse is minimized, and cortical matter can be expressed with even greater facility than after an iridectomy. Moreover, the modified iridotomy requires no such rough handling of the iris and causes no such pain as iridectomy, while it is superior to the latter in its cosmetic and optical results. The excision of iris tissue is made where it will be most effective in preventing iris prolapse and at the same time do the least damage from an optical standpoint. In the case of iridectomy, a large section of the sphincter muscle is always removed so that the reaction of the pupil to light is necessarily much impaired, whereas in this operation the sphincter muscle is simply incised and the pupillary reactions less interfered with. For this reason, as well as on account of the narrow coloboma finally obtained, the dazzling on exposure to bright light often complained of after iridectomy is after this method notably absent. The optical results are, in fact, practically as good as after the simple extraction or the Chandler buttonhole operation.

Objection may be raised to the introduction of an additional instrument into the eye. It would seem, however, that the danger of infection or traumatic inflammation must be less from the introduction of a sterile instrument into the anterior chamber than from the trauma to which the iris is subjected in ordinary iridectomy.



There are two questions in connection with the operation which probably can be answered only after further experience with it. One is the question as to the best situation for the corneal incision, and the other as to the proper size of the hole in the iris. I have always made the incision at the limbus, because this must unquestionably give the best optical results. An incision here, however, is apt to be attended with considerable bleeding, which, with the conjunctival flap, may obstruct the view and thus render the operation more difficult. In regard to the size of the hole in the iris, I have made it as small as possible, but the danger of iris prolapse would no doubt be still further reduced if it were made comparatively large. In any case it should not, of course, be made so large as to remain uncovered by the upper lid.

Massage as Adjuvant in Treatment of Stricture of the Urethra.—A. Settler calls attention to the frequent spastic contraction accompanying urethral stricture, and recommends supplementing surgical measures with inunction of an ointment and massage. In his communication to the *Siglo Medico*, liii, 817, 1906, he states that he uses an ointment to promote absorption composed of 4 gm. potassium iodid and 15 gm. each of lanolin and cold cream. A piece of the ointment about as large as a cherry is massaged into the part corresponding to the stricture, increasing from gentle manipulations at first until so strong that the patient finds them painful. He repeats this daily, and has found it extremely useful as an adjuvant measure with surgical measures, dilatation or the like.

* Read in the Section on Ophthalmology of the American Medical Association, at the Fifty-seventh Annual Session, June, 1906.