the lumina becoming entirely filled with round cells; furthermore, it is possible to find a brownish pigment which can easily be differentiated from melanosaarcoma. Very rarely do the thrombi become calcified.

In conclusion, I desire to express the belief that venous angiomas do not take on malignancy, but that on account of the constant irritation due to their presence the overlying epithelium may take on carcinomatous changes.

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Original Articles

CATARACT EXTRACTION.

I. IS THE CASE OPERABLE? II. PREPARATION OF THE PATIENT. III. THE ANESTHETIC.*

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I. IS THE CASE OPERABLE?

In opening this subject I fear that I have little to give that is new or even interesting. The question whether a case is operable must be decided from three standpoints—that of the general health of the patient, the condition of the eye and its surroundings and the state of the cataract itself. There has been, as far as I know, but little recent change in the accepted views on these points. Chronic heart, lung and kidney disease and diabetes are no longer considered bars to operation, provided the patient is put into the best general condition which his disease will permit, and also provided, of course, that this condition justifies the operation. Coughing reduced by treatment to a minimum, the inability to lie down in bed and other necessary concomitants of the diseases mentioned are not as important as the estimate of the general condition of the patient. And as the operation can to a certain extent be adapted to the needs, such diseases are of importance not so much on account of the possible difficulty in operating as from the increased susceptibility of the patient to infection by decreased resistance and to post-operative delirium with its attendant misfortunes. This, it seems to me, is about the worst of post-operative troubles. Old age also is not in itself a contraindication to operation; senility, however, is.

We have to do, in our estimate of the general condition, not with the success or failure of the operation from the point of view of vision, but with the possibilities of suppuration or plastic inflammation, entailing long suffering and many times shortening life. The statistics of suppuration in cataract cases at the Massachusetts Eye and Ear Infirmary for the last ten years show that about a third of the cases were due to infection by the hands, in most instances in connection with delirium. Marked arteriosclerosis and hypertension increase the risk of choroidal hemorrhage, but treatment will alleviate the condition somewhat and operation is justifiable. I have never seen sudden death follow cataract extraction in the old; I have, however, seen most of the other possible melancholy results, and my dread of them is genuine. It is well then to make the estimate of the general condition as carefully as possible, with the history of the past as well as the present in

view. After all is done that can be there yet remains the unknown element. Patients with everything apparently in their favor may go to pieces and others with evident cause for fear go through the ordeal with astonishingly little upset.

In the consideration of the eye and its surroundings the condition of the tear passage is of the greatest importance. There is, I think, nothing new to be said of it; it is, and bids fair to remain, the greatest source of danger, not only in its diseased state, but to a certain extent in its normal condition as a channel for infection from the naso-pharynx. If treatment of the more ordinary kind does not relieve the case sufficiently to justify operation, we must have recourse to the extirpation of the sac, obliteration of the canaliculi with the cautery or occlusion of them temporarily with a suture. I have found in a limited experience that this last procedure has been satisfactory. It is generally regarded, I think, that a purely watery secretion from the sac is harmless. Perhaps it is in itself, but I am confident that I have seen such a discharge changed under the influence of the bandage into a virulently purulent one, and I would suggest in any such case that a preliminary test with the bandage be made for a few days.

I am distrustful of eczema. The bandage, of course, aggravates it, and either because of the trouble itself or from the irresistible desire of the patient to lift the bandage and scratch, thus causing infection, there is considerable danger. The condition of the conjunctival sac and edge of the lids also demand attention. It seems impossible, for a number of reasons, to make bacteriologic investigation a basis for operation, but in any suspected case the recommendations of Dr. C. S. Bull should be carried out:

A careful microscopic and bacteriologic examination should be made of the contents of the conjunctival sac in every suspected case, carrying the examination as far as the cultivation of the bacteria in a proper medium and the subsequent inoculation of the germs. If toxic germs are found in great number, no matter what their varieties, no operation on the eyeball should be undertaken until the germs have disappeared, and the conjunctival sac has been rendered as sterile as we can hope to make it.

In a given number of infections there are always some which are not easily explained by the more ordinary and well-known causes. It is quite possible that the state of the naso-pharynx may account for some of these. No one, of course, would operate during any acute process in that region, but there are also chronic conditions which should be taken into account, such as chronic and atrophic rhinitis with crusts about the lachrymal duct, ozena and tonsillar crypts. In any case preliminary cleansing of the passages as recommended by Dr. Lippincott is an added safeguard.

The question whether the case is an operable one has to do also with the condition of the cataract—whether it is immature, ripe or hypermature. I take it that it does not come within the scope of this short paper to discuss all the problems relating to this part of the subject. It is certainly right to operate on a hypermature cataract under any conditions which make immediate operation advisable. To this form of cataract, it seems to me, the extraction in capsule is most applicable, and if it were possible to eliminate the disadvantages of this operation, hypermaturity of a cataract would be the condition of choice. The problem of the immature cataract seems about as far from solution as ever. Ripening operations have not, certainly in my part of the country, proved popular, and my own small experience

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has not been favorable. Intracapsular irrigation, too, has not gained the majority as adherents, certainly not as used by McKeown for the ripening of cataracts. Extraction in capsule is too hazardous, and I should feel that its performance was unjustifiable unless the prospects of an improved condition were remote and other urgent reasons for its performance were present. We meet cases, however, at times in which it would seem that the risk of operating was no more than that brought about by frequent examinations and disappointing postponements.

II. PREPARATION OF THE PATIENT.

The preparation of the patient should be general—physical and mental—in addition to that accorded the eye. The first thing of importance is the state of the bowels. Recent writers have shown how intimate and important is the relation of the eye to the intestinal canal. It would be well to inquire into the patient's history in this respect and correct any abnormality as far as possible beforehand. The customary cathartic should be given the night before the operation, followed by a saline the following morning, being sure that the effects have passed before operating.

A warm bath should be given. Shampooing the head seems to me objectionable in a patient not used to it. It is likely to cause a cold, an unpleasant accompaniment of a cataract extraction. The eyelids and surrounding region, especially the brow, should be well washed with soap and water and wiped with sterile gauze or cotton; the edge of the lids should be carefully cleaned and wiped with the same. The conjunctival sac must be washed out gently with sterile water or physiologic salt solution. In many cases, perhaps in all, it would be well to drop argyrol in the eyes for a few days beforehand. In spite of the doubts recently cast on this drug, I believe it to be a very efficient one. It was the older custom at the Massachusetts Eye and Ear Infirmary to make all these preparations the night before the operation and to bandage the eye over night, often with the addition of some antiseptic salve. The next morning the eyelids were, in many cases, stuck together and there was secretion in the conjunctival sac. This practice was soon abandoned and the cleansing was done on the morning of the operation. The present routine method, however, and the general rule of the hospital for all operative cases is to make the preparations the night before, to put White's ointment of bichlorid¹ in and over the lids and to bandage. Under this method it is rare to find the eye in the morning other than perfectly white and quiet, and free from secretion. Certainly from a clinical standpoint this has proven satisfactory, though I am not aware that any bacteriologic tests have been made. After the bandage has been removed the less done the better; gently wiping the lid margins again, as would naturally be done to remove superfluous salve, and gentle irrigation of the sac with the salt solution is sufficient. After this, until the actual operation, the eye should be kept covered with a moist piece of sterile gauze or cotton.

There is beside this another preliminary of importance—the mental preparation of the patient. I believe it helps the patient to bear the operation and the after treatment if he is told what he may expect and what is required of him. It is wise that he should believe the operation simple and that it will almost certainly be suc-

cessful. He should be told what he must and what he must not do during the operation; instruct him to think not of what is being done but of what he is told to do, to make any ordered movements slowly and to be relaxed and calm.

I am not of the opinion, however, that the same mental preparation ought to be accorded the relatives and friends. Some one at least should know that the surgeon is to do something more than shell out a pea, though that simile may do for the patient. We have been so diligent in making patients comfortable concerning cataract extraction that I think the operation is generally considered simple and failure impossible, even by physicians, if I may judge from what I have heard. I think the operator owes it to himself that some one should know the true state of affairs, not necessarily, however, all the disagreeable possibilities. In the hospitals, and to a certain extent outside, tradition does much for the favorable mental preparation of the patient. One patient tells another that there is no pain to dread and that the discomfort is trivial.

Just before operating a repetition of the instructions, a short drill in the needed movements and during the operation, gentle and encouraging guidance, are helps of great value. It seems to me undesirable that the patient should be in the hospital more than one day before the operation. He can in that time become perfectly familiar with the surroundings, longer than this will be spent in worry and fear. During this time the room should not be darkened. A hypnotic to ensure a good night's rest is often advisable. With the use of morphia for this purpose, and with its more prolonged use for the alleged beneficial action on the healing process, I have had no experience. I should feel that to justify such use its advantages must be many.

III. THE ANESTHETIC.

Of local anesthetics one has a considerable range of choice. My personal experience is limited to cocain and holocain. I have, however, found no one who, having experimented with alpha-eucain or beta-eucain and tropacocain, has been converted to their use. Alpylin (hydrochlorid of benzoyl—2—ethyl—1, 3—tetramethyldiaminopropan—2—ol) may prove valuable, but at present little can be said about it. These anesthetics differ one from the other in the rapidity, duration and intensity of their action, in their influence on the pupil, in their irritating and antiseptic qualities and also in the amount of hyperemia they cause. They differ, too, in toxicity, holocain and cocain being the most poisonous of the group. This, however, amounts to so little that it need hardly be considered. If the patient were known to be very susceptible to cocain, tropacocain, which is the least toxic, could be substituted. Holocain has enjoyed considerable popularity on account of its having no action on the pupil, tension or corneal epithelium and because of its bactericidal properties. Of these advantages, the only practical one, it seems to me, is its freedom from action on the pupil. It is on this account, theoretically at least, more fitted for use in simple extraction than is cocain. The effect of the latter on the corneal epithelium can usually be avoided. It is not necessary to go further into detail on this subject. It would seem then that cocain was the most generally useful of the anesthetics, holocain being substituted for it in certain cases.

The method of using the cocain is of some importance. The 2 per cent. and 4 per cent. solutions are most commonly used and seem sufficient. Dropped in the eye

1. This ointment, recommended by Dr. J. A. White of Richmond, Va., is as follows:

R.	Hydrarg. bichloridi.....	gr. i	106 30 180
	Sodii chloridi.....	gr. v	
	Petrolati	ʒvi	

two or three times at five minute intervals good anesthesia results. The use of a 10 per cent. solution tends to emphasize the disadvantages of cocain, and I think it preferable for anesthetizing the deeper structures, to allow a drop of the weaker solution to run into the anterior chamber, after the section has been made.

THE INCISION FOR THE EXTRACTION OF CATARACT AND THE IRIDECTOMY.*

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In studying the incision employed for the extraction of cataract we need not go further back in the history of the incision than the time of Daviel.¹ The operation of extraction, as a recognized method of removing cataract originated with Daviel, the method having been matured about the year 1750.

The incision employed most frequently by Daviel and the one referred to when the term "Daviel's incision" is used is a flap incision (Fig. 1) made entirely in the corneal tissue close to the scleral margin. The cornea was first pierced by means of a broad needle at its lower margin; then, by means of small, blunt-pointed knives and by curved scissors (Daviel's scissors, right and left), the incision was continued on either side until almost two-thirds of the cornea near its margin had been divided. In the latter years of Daviel's life the incision was made shorter. In order to afford more support to the iris and to simplify the incision, Daviel introduced, during the last years of his life, a triangular incision (Fig. 2) with the base inward in some cases, with the base upward in other cases.

Since Daviel's time many forms of incision have been introduced. The principal ones will be described in chronological order.

Richter² advised an incision in the lower half of the cornea (Fig. 3) close to the margin of the cornea, to be employed in the operation for removing the lens in its capsule by gentle pressure after first freeing the lens from its attachments to the suspensory ligament.

De Wenzel³ employed an incision (Fig. 4) through the cornea extending from the temporal to the nasal margin in the horizontal meridian for the removal of opaque, shrunken lenses and soft cataract. A few years later De Wenzel advocated a flap incision for the extraction of cataract (Fig. 4). The line of the incision followed the margin of the cornea $\frac{1}{4}$ line (0.5 mm.) from the sclera and extended from a point 45 degrees above the horizontal meridian on the temporal side to 45 degrees below the horizontal meridian on the nasal side, thus including one-half the circumference of the cornea. It was thought that such an incision would be less apt to gape because of the support of the upper and lower lids.

Santerelli⁴ advocated a corneal flap upward, including about three-fifths of the cornea. The incision follows the periphery of the cornea, its central point falling on the vertical meridian of the cornea above (Fig. 5).

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1. Sur une nouvelle methode de guerir la cataracte par l'extraction du cristallin, Mem. de l'Acad. d. chirurgie, 1753.

2. Abhandlung v. d. Ausziehung d. grauen Staar, Göttingen, 1773.

3. Traité de la Cataracte, Paris, 1826.

4. Ricerche per facilitare il cateterismo e l'estrazione della cataracta, Vienna, 1795.

Beer⁵ began to employ the Richter incision in 1790 and appears to have practiced it continuously, making the flap downward as a rule, but also making it upward in not a few cases. Beer introduced the triangular knife which still bears his name, the use of which markedly simplified the making of the incision (Fig. 3).

Mr. Wardrop⁶ introduced an incision, which is described as follows (Fig. 6): Puncture on temporal side of the cornea one line from the scleral margin and a little above the transverse diameter, the direction being perpendicular to the surface of the cornea. When the point of the knife has entered the anterior chamber it is directed to a corresponding point on the nasal side of the cornea, where the counter-puncture is made. The incision is then carried a little downward and forward, then the knife is rotated sharply so that the edge is directed forward and the incision is finished by cutting directly outward, nearly perpendicular to the surface of the cornea. The incision should be made so that the lower margin of the wound is midway between the lower margin of the cornea and the lower margin of the moderately-dilated pupil. Its advantages are: 1. Large opening; 2, firm flap, not very large; 3, corneal margin broad to support iris.

The linear incision, variously placed in the cornea and of various lengths, was employed even before the days of Daviel for removing soft lens substances.

Sir William Adams⁷ employed the linear corneal incision for removing all cataracts which could be broken up.

Guthrie⁸ made the incision in the lower part of the cornea, most often (Fig. 7) beginning slightly above the

Fig. 1.—Daviel's incision.

Fig. 2.—Daviel's inter-incision.

Fig. 3.—Richter's incision (Beer's knife).

horizontal meridian and carrying the incision around the periphery of the cornea one line from the scleral margin. In some cases the incision was made above.

Makenzie⁹ advocated the flap incision and recommends that it be made in the upper part of the cornea in all cases except in those patients who have difficulty in looking down, when the incision should be made in the lower half of the cornea.

Graefe's classical linear incision was the result of his experience in the extraction of cataracts by means of the linear incision in the cornea, first employed by Palucci for removing membranous opacities from the pupillary area, and his desire to place the incision so that the loss of eyes from suppuration would be less frequent. The loss from suppuration when the corneal flap was the incision employed was from 7 to 10 per cent. Graefe urged, and very rightly so, that the healing of the wound would progress more rapidly if it were made where the blood supply was abundant, and that the resistance of the tissues to injurious influences would be greatest when the nutrition to the tissues was best. By placing the incision in the sclera he succeeded in reducing loss by suppuration very considerably. After a careful and prolonged study of the subject, evidence of which appears

5. Lehre d. Augenheilk., 1817.

6. Practical observations on the mode of making the incision of the cornea for the extraction of the Cataract, London, 1808.

7. New Operations for the Cataract, 1817, p. 138.

8. Operative Surgery of the Eye, London, 1830, p. 320.

9. Diseases of the Eye, American Edition, 1855, p. 747.