CAPSULOTOMY METHOD OF LENS EXPRESSION*

By DELAMERE F. HARBRIDGE, M. D.
Phoenix, Arizona

DISCUSSION *by Lloyd Mills, M. D., Los Angeles; Dohrmann K. Pischel, M. D., San Francisco.*

OPHTHALMOLOGIC literature discusses from every conceivable angle the cataract problem. What the essayist writes may to some seem academic, or the repetition of mere platitudes. The very fact that so much has been written and that such a variety of measures have been proposed in the treatment of cataracts is inferential evidence that the ideal procedure has not yet been attained.

Of a conservative temperament and having developed in conservative medical surroundings and with the ever present thought that a patient's eyesight is the goal, the writer, perforce has elected the capsulotomy method, with a preliminary iridectomy, as the preferable method in dealing with the removal of a senile cataract. The manner of doing this operation in many details is individual in style.

Relevant to this matter, the author quotes the pertinent statement made by Doctor Zentmayer, his teacher and ophthalmic guide. Doctor Zentmayer states that "the utility of an operative procedure must be estimated, not by the technique and results of its most skillful interpreter, but by those likely to be attained by a surgeon of average ability." Wilder observes that the value of any cataract procedure is not proved by the visual acuity obtained, statistically recorded, but rather by how little reaction to the trauma results.

Having fixed upon the capsulotomy operation, and judging by his personal experience, the writer has no reason to delve into the mysteries of other methods, but is quite content to await a better procedure which will come as the numerous heterodox methods crystallize into an orthodox procedure.

PREPARATION OF PATIENT

This embraces a proper preparation of the field of operation: a well-chosen assistant, fully competent to control the lids; the needed assortment of instruments; and a coöperative mental attitude of the patient. The field is prepared in the usual manner, with the possible difference that the ciliary borders of the lids are not scrubbed, simply gently wiped. Wilder's suggestion is valuable. Remove the cilia with scissors, leaving the central ones to be used as a handle, for, as he points out, the operator's attention should be centered precisely upon the corneal section, and in doing so it is quite possible that the point of the knife, unobserved, is likely to come in contact with a few stray cilia at the extremities of the lids. The possible infection from the lid borders, or the danger of interference by the cilia, the writer largely guards against by the use of solid and rather broad lid retractors, they being retained in position by a competent assistant until completion of the entire operation, thus avoiding all unnecessary manipulation of the lids. Particular attention should be directed to the lacrimal sac. Culture and examine the conjunctival secretions, and when indications seem to warrant it examine the conjunctival scrapings. Examination of the comparative ratio between the systolic and diastolic blood pressure, with especial attention to the latter, is of vital importance. As a preliminary step, but of no less importance, is the cultivation in the patient of a proper mental attitude, so necessary for complete coöperation. This is encouraged by a full confidence between surgeon and patient. Do not request too much of the patient, but rather encourage him to assume a passive frame of mind. One under the stress of a cataract operation should not be burdened with too many admonitions, or his equilibrium is liable to be so disturbed that he will be unable to properly coördinate. During the operation there should be absolute silence. Not only is it unbecoming for the surgeon to assume a bombastic, domineering demeanor, but it is fatal to the best interests of his patient. How purposeful are the words of Ammar of Mosul, that Egyptian eye surgeon who originated suction in soft cataract, now known as Daviel's extraction. He was very solicitous for the welfare of his patient, shuddered with desperation if the operation did not progress favorably. He recommends "to proceed with caution and circumspection, addressing kind words to his patient when the cataract needle enters the eye." He makes great demands upon the eye surgeon—that he should be provided with sharp senses, a sure hand, and greatest experience.

ANESTHESIA

Too much emphasis cannot be placed on the matter of thorough anesthesia. Not only surface anesthesia, but complete lid anesthesia is essential. Van Lint's method of injecting a 2 per cent novocain solution along the lower orbital rim, in the neighborhood of the external canthus and over the site of the lacrimal sac, is ideal. The greatest single advance in cataract surgery is undoubtedly due to proper lid control. Satisfactory lid anesthesia, together with full confidence between patient and surgeon, represents 90 per cent of success.

OPERATIVE PROCEDURES

It is the writer's practice to do a preliminary iridectomy. It guards against the iris falling in front of the knife when later making the corneal section. It facilitates the capsulotomy. It overcomes the need for the patient to look downward at the time of lens expression. It is a possible aid in maturing not fully ripe lenses. In some it may temporarily improve vision. It is a safe-

* Read before the Eye, Ear, Nose, and Throat Section of the California Medical Association at the fifty-eighth annual session, May 6-9, 1929.

guard against glaucoma. It avoids extra trauma at the time of lens expression, thus obviating a disturbing bleeding which would seriously inconvenience further manipulations. The most important feature, however, is the fact that the patient receives an education as to the required conduct necessary for successful coöperation. In turn the surgeon learns the temperamental peculiarities of his patient, and how his tissues react to the insult inflicted. In a discussion with one of our country's most distinguished eye surgeons on this matter of preliminary iridectomy that surgeon stated that while he used, upon occasions, some of the newer methods, yet if his eye was to be operated upon for cataract, he certainly would desire a preliminary iridectomy, followed later by capsulotomy and expression.

An interval of three or four weeks is allowed to elapse before making the corneal section. A well-made, clean incision, properly placed, lends much to success. Unmindfulness of this feature may precipitate serious consequences. The incision must be of such length as to permit the lens to escape readily, without stripping the cortical material from the nucleus or breaking of the lens. Leaving an undue amount of cortical substance within the eye has a distinct disadvantage, subjecting the eye later to possible serious positive lens reaction.

The incision must be so placed as to give the required length without invading important uveal structures, and also avoid the possibility of later gaping of the wound. While the use of sutures is advocated by some, it has many inconvenient features. The placing of the incision in that portion of the cornea which is best nourished aids much in the future healing process. Primary healing of the wound is essential. An incision placed entirely in the sclerocorneal limbus, occupying about two-fifths of the circumference of the cornea, will meet more nearly the needs; if placed wholly in the cornea, a much larger incision will be necessary, thus courting the dangers from a gaping wound. A small conjunctival flap is desirable in that it heals more promptly and thus seals the wound. If a small hemorrhage is encountered, it can be controlled by the use of epinephrin.

After the corneal puncture is made, the blade of the knife is pressed forward, making the counter puncture and without hesitation cutting up in the line of the limbus deftly and promptly. Immediately before completing the section, less aggressive action is essential. The entire procedure requires the nerve of a lion and the tactile delicacy of a lady's hand. The writer is accustomed to use a knife, the belly of which is two and one-half millimeters in width, and straight up, to within four millimeters of the point. Daviel, who in 1753 really was the inventor of the intracapsular method, devised this semicircular incision. Since that time it has undergone many modifications, only to return to its original form. Couching, which showed a 40 per cent loss of eyes, was thus reduced to 10 per cent, and later Albrecht von Graefe's introduction of the capsulotomy method further reduced the loss to between 2 and 4 per cent.

In performing the capsulotomy, the method of incision is quite individual to the operator. Knapp suggests an incision paralleling the corneal section. Crucial incisions of A and V type are recommended. The writer's practice is an attempt to join two semicircular incisions. In recent years forceps have come into greater use than formerly in the removal of the central portion of the capsule. Certain distinct advantages are gained with this method in preventing the wound closing, and thus retaining some of the lens material. The disadvantage of the retention of an undue amount of lens material is obvious. In the use of forceps the danger of a sudden upward movement of the eye is to be guarded against. Fischer has devised a special forceps for this purpose.

In the removal of the lens, three anatomical features are presented: the capsule, the cortex, and the nucleus. Immediately we are confronted by one of two procedures, whether delivery of the entire lens in its capsule, "the intracapsular method," or the delivery of the lens, cortex and nucleus, leaving much of the capsular membrane, "the capsulotomy method." The writer elects the latter. For the purpose of lens expression, two spatulae of two millimeters in width are used, one curved on the flat at the outer half at about forty-five degrees. One guards the wound; and with the convex surface of the curved spatula, pressure toward the interior of the eye is applied, just inside the lower limbus, opposite the lower lens border. The pressure should be firm, steady and definite at first, cautiously and gradually increasing in force. This causes the wound to gape and the lens to start. Such directed and controlled pressure is continued until just before the greatest thickness of the lens is about to be engaged in the wound. At this time it is well to pause a moment to allow the tissues to accommodate themselves to the decreasing tension. The succeeding pressure is to be directed upward toward the wound, bringing along with the spatula the nucleus and as much of the soft cortex as possible. The first pressure tilts and displaces the lens, causing the edge to present. The second pressure forces the lens out of the eyeball. To accomplish this phase of a cataract operation requires a trained eye and a hand capable of exerting with delicate precision just the right pressure to achieve the desired results. As the lens is delivering, the pressure is lessened, but the same level is maintained and the spatula turned slightly, so that the convexity will receive the lens nucleus and as much of the cortex as may come away. Remaining soft cortex or lens débris may be removed by repeating the corneal pressure two or three times. Many operators accomplish this by irrigating the anterior chamber. It is the writer's habit to "get in and get out" with the least amount

of manipulation. At no time is the patient commanded or unduly urged to change the position of his eye from the primary position. This more or less passive position is much in accord with the passive attitude of the patient. Should there be, after delivery of the lens, undue gaping of the wound, or the presentation of uveal tissue, or perchance vitreous, further manipulation is immediately stopped and the lids allowed to gently close. After a rest of several minutes the field of operation is again exposed and the toilet of the eye completed.

Prompt and uncomplicated recovery is greatly facilitated by a well-conducted toilet. The completeness with which these measures may be carried out depends greatly upon the conduct of the patient. In the tractable, this program can be conducted successfully, but in the utterly intractable patient it is far safer to attempt only the most imperative measures. Removal of any remaining cortical material, if not successfully accomplished by stroking the cornea, may be attempted by irrigation. Probably the safest apparatus is an all-glass syringe with a small metal pipe such as a dentist uses in irrigating a dental canal. The tip should be placed at the lips of the wound, certainly not beyond the inner edge. Occasionally a spatula or a Daviel spoon is of service. Reposition of the iris, freeing the angles and smoothing out the pillars of the coloboma are best done by the spatula. The incision is to be cleansed, freeing it from all débris, and with forceps gently removing any shreds of clotted blood. Careful coaptation of the lips of the incision and placing in position the narrow conjunctival flap completes the procedure.

Both eyes are covered with a light dressing and a pad of four or five thicknesses of gauze, with four tapes, two longer so that they may be tied in the neighborhood of the ear, the whole being held in position by two strips of adhesive. No heavy or cumbersome masks or dressings are used. In perfectly smooth cases the eye is not inspected or the dressing changed for four days.

RESULTS

In selected cases of cataract 85 to 90 per cent of the operations will yield first-class results. In unselected cases, probably 15 to 20 per cent will show indifferent results or loss; about 5 per cent are failures. Many of the difficulties are due to intractable patients, diseased conditions, inadequate lid control, poor instrumentation, particularly improper knives, and lenses with large nuclei and small sections.

After-cataract is a complication present in probably 75 per cent of cases. Knapp, together with others, advocates early discission. The writer feels more confident to wait six weeks to two months. By either the Knapp or Ziegler method, or the small de Wecker scissors, he has always found it a difficult procedure to produce a good opening in the capsule. However, since Wheeler has given us his method of dealing with after-cataract, the question has been simplified to almost 100 per cent ideal.

OPERATIVE PROCEDURES COMPARED

In 1911 the Chicago Ophthalmic Society presented a very exhaustive symposium on the expression of senile cataract. This symposium was taken part in by nineteen distinguished ophthalmic surgeons. All phases of the subject were discussed, based on the best information obtainable up to that time. It was a time, many will remember, when intracapsular methods were being actively discussed. One hundred and sixty replies to a questionnaire received from ophthalmic surgeons throughout this country relative to the comparative merits of the capsulotomy and intracapsular methods were analyzed. It is somewhat interesting to observe that (knowing the personnel, to a large extent, of the list that replied to the questionnaire) one can associate the intracapsular operation with those of a more venturesome turn of mind. Of the one hundred and sixty replies, only 30.6 per cent had performed the intracapsular operation, 34.6 per cent of this number considered the intracapsular method inferior. Some of the objections offered were: greater difficulty in performing the operation, loss of vitreous, lack of safety for the operator of average ability, and a greater percentage of poor cosmetic results. Of the percentage that had performed the operation, 22.4 per cent reported poorer vision. Those doing the capsulotomy method reported from 40 to 80 per cent of their cases required a discission. Eight noted iritis, one glaucoma, and four reported infection. Since that time much experience has been accumulated. The writer selected eight of the outstanding surgeons who answered the questionnaire and to these he addressed communications calling attention to their answers in 1911, and requested their further opinion based upon subsequent developments. Their replies were as follows:

Jackson, Edward.—His opinion has not changed. The intracapsular methods have failed to do what was hoped from them. For his own eyes he would not submit to the intracapsular method.

Zentmayer, William. — Capsulotomy method safer. Looks with favor on the Knapp's intracapsular method, but does not do any of the intracapsular operations.

Würdemann, Henry.—Does about 60 per cent of his cases by the intracapsular method. About five hundred cases since 1908.

Fisher, William.—Has changed his intracapsular methods of operation. Does not do the Smith operation any more. Does a modified Barraquer method. States if surgeons would be fair and noted amount of postoperative inflammation and poor vision due to retained capsule, they would not stress the complications which sometimes follow the intracapsular methods.

Wilder, William.—Does an intracapsular operation similar to the Knapp method. If it were his

own eyes he would prefer a preliminary iridectomy, followed by a capsulotomy and expression.

Green, John.—Believes the capsulotomy method a better and safer procedure for eye surgeons of average ability than any intracapsular method so far devised.

De Schweinitz, George.—Believes cystotome should be abandoned. Uses capsular forceps. Believes Knapp's method the best intracapsular method, if advising an intracapsular operation. Personal experience too limited.

Gradle, Harry S.—Has abandoned intracapsular methods owing to slow closure of wounds, ruptured capsule, drawn pupils, poor cosmetic results. Regards combined capsulotomy method only safe procedure.

SUMMARY

The above procedures reflect much of the writer's views regarding the cataract problem. It is to be remembered, however, that expedience and community conditions govern or modify many accepted principles of eye surgery. It is almost axiomatic in eye surgery that subsequent complications are minimized by the fewer steps to an operation and the least amount of trauma inflected.

It may be, perchance, that dealing with certain types of cataract, or with certain classes of patients, such as Colonel Smith came in contact with, or clinic patients in large cities of this country, the intracapsular operation may fulfill the needs of a limited number. However, in the practice of the ophthalmic surgeon of average ability, or in the average community, it seems to the writer very ill advised to undertake such a procedure.

Goodrich Building.

DISCUSSION

Lloyd Mills, M. D. (609 South Grand Avenue, Los Angeles).—Patients have the right to expect that every measure which safeguards them from complications during and after cataract extractions will be used provided the risks of operation are not increased thereby. Certain cases clearly are capable of almost ideal operative measures such as the various forms of extraction within the capsule may be in skilled hands. Other cases manifestly demand combined extraction.

Men who do ten or twelve cataracts a year never acquire the skill or judgment necessary to separate these cases. It is generally recognized that the safest procedure for these occasional operators is the combined extraction done with blocking of the facial nerve. It is not clear how many surgeons still can persist in leaving their cataract wounds open to infection and to all the complications which delayed healing and unusual strain can cause during convalescence. Nowhere else in the body do surgeons have the temerity to leave the wounds of vital areas open to any and every possible mischance. To prevent this the use of the full conjunctival flap and its complete suture have been introduced and are unqualifiedly urged by those who have had sufficient experience with both methods to know the protective value of the full suture. By its means secondary infection and secondary glaucoma almost have been eliminated and practically all other complications save those arising from the retention of lens material have been reduced almost to the vanishing point. Most of the younger eye surgeons throughout the world are adopting this measure, which is applicable to nearly all forms of adult cataract operation.

❋

Dohrmann K. Pischel, M. D. (490 Post Street, San Francisco).—In discussing the advantages of the capsulotomy method of lens expression we must certainly emphasize the important advances of the past decade or two, which have so vastly improved the end results. Therefore I was surprised that the author dismissed the subject of capsule forceps with a few sentences. The importance of this subject is brought out in one of the replies to his questionnaire which the author quotes as follows: "De Schweinitz believes cystotome should be abandoned. Uses capsule forceps."

The advantages of the capsule forceps can hardly be overestimated, and should certainly be stressed. The removal of a large central piece of the anterior capsule accomplishes several things. It removes that portion of the capsule just in front of the pupil which furthermore might be opaque and thus interfere with good vision. By substituting a lacerated wound in the capsule for an incised one, it does not allow the capsule to rapidly close again and thus seal off the retained cortex which will form a dense secondary cataract. Naturally, with a proper hole in the anterior capsule, it never closes in the pupillary area. Thus the aqueous has free access to any retained lens cortex there and quickly absorbs it. The result is the appearance of a black pupil in a surprisingly short time, even when a large amount of cortex has been left behind. The contrary was true when a linear incision was made with the cystotome, for the capsule wound was quickly sealed and no absorption of cortex could take place.

I do not believe that there are any valid objections to the use of the capsule forceps. As they can be withdrawn very easily and quickly, the danger of a sudden upward movement of the eye is less when they are employed than when the cystotome is used. The possibility of luxating the lens into the vitreous cavity by too great pressure on it when attempting to grasp the anterior capsule is so remote when done properly that it can be entirely disregarded.

The high incidence of secondary cataract after capsulotomy operations of the older type (so heavily stressed by the intracapsular advocates) has always been considered the chief disadvantage of this operation. Its prevention has been eagerly sought by many means. Here we have the crux of the whole situation. With the capsule forcep technique the complication of secondary cataract is practically removed, and with it such unnecessarily high incidence of operations for after-cataracts as 75 per cent will disappear. Twenty to 25 per cent will then be much nearer the correct figure.

In closing, I might also mention the use of Hess' spoons in the delivery of retained cortex. This instrument was designed by that master operator, the late Professor Hess of Munich. These broad spoons enable one to massage out considerable material and thus hasten convalescence.

❋

Doctor Harbridge (Closing).—The writer wishes to express his appreciation to the colleagues who have discussed his paper. He wishes especially to thank Doctor Pischel for the emphasis he has placed upon the importance of doing a proper capsulotomy. The use of capsule forceps perhaps should be the procedure of election. The author described the technique he has been accustomed to use and therefore described the method which had for its object the same end as suggested by Doctor Pischel, namely, the obliteration of the central portion of the anterior capsule, thus allowing more complete absorption of any remaining cortex.