THE RIPENING OPERATION FOR IMMATURE
SENILE CATARACT; ITS PLACE.*FRANK C. TODD, M. D.
MINNEAPOLIS, MINN.

The earlier belief that a patient must await the time of complete maturity of a cataract before extraction could be performed with safety, led to the development of various artificial methods to hasten ripening. But this meant the performance of a preliminary operation, and Schweigger, in 1890, advocated the removal of immature cataracts after the age of 50, claiming that sufficient hardening of the lens has taken place at this age to enable the operator to remove the entire cortex. Many operators have followed and advocated this practice and the number seems to be constantly on the increase.

Yet it is a fact that ripening operations are still practiced by some surgeons with success, in all cases in which conditions make it humane not to wait for nature to bring about maturity, in preference to extracting an unripe cataract, while many other operators often perform the ripening operation under like conditions. Thus there seems to be a great difference of opinion regarding this very important question.

The ultimate question to be determined is, whether in those cases in which, for reasons to be mentioned later, we think it unwise to wait for maturity, we shall always extract an immature cataract, always perform a preliminary ripening operation, or whether there are not cases in which it seems best to do a ripening operation, and other cases in which the extraction of an immature cataract seems the wiser course. It is for this purpose that I present this subject at this meeting, and ask for the experience of the members of the section.

In years past this section has discussed the ripening operation,¹ and last year it expressed the almost unanimous opinion, in answer to Dr. Bulson's² inquiries, that it believed the practice wise, in selected cases, either to remove an unripe cataract or to perform trituration and then to extract. In order to secure the most recent expression from operators of experience, I have addressed letters to many prominent ophthalmologists of the United States, from whom sixty-nine replies have been received. These replies form a supplement to my paper, and for the detailed statement of the questions asked, with their replies, the reader is referred to this portion of the paper.

As evidence that trituration has not yet been discarded by many operators, the fact should be noted in these replies that twenty-six surgeons still practice the operation when occasion demands, that four rarely practice it, but nineteen who have had some experience now do not practice it at all, preferring the extraction of immature cataract, usually with irrigation. Of those who continue to practice trituration with satisfactory results, note the opinion of Colburn, who has operated on forty-seven patients; of Ayres,³ Wescott, White, Prince and others, who frequently practice intraocular massage with preliminary iridectomy, and have satisfactory results; of Ball, who has had much experience and similar results; of Wilder, who practices Forster's method in "certain cases" in which he performs preliminary iridectomy,

but otherwise prefers to extract an immature cataract. The following significant paragraph is by de Schweinitz:⁴

The safest plan is to wait for maturity; but if this is impossible or very undesirable, the author has been in the habit of extracting an unripe cataract in preference to performing a ripening operation. This formerly was also the practice of Knapp; but recently he has ripened immature cataracts in a certain number of cases by the method of internal trituration, as employed by Boerne Bettman⁵ and others, and has been satisfied with his results.

That Knapp approves of artificial ripening under certain conditions is shown by his opinion expressed at the end of this paper.

On the other hand, however, note the statement of Risley, who tried a series of twenty-five cases, mostly by trituration directly on the capsule, and does not think his results were as good as after extraction of immature cataracts. He has entirely given up the operation, and does not think it is to be commended.

Many others, as Kipp, Callan, Lewis, Hubbell, Bull, Ellett, Griffin, Reynolds and Posey performed trituration formerly but never do so now. Others, as Taylor, M. Black, and Carrow, have not cared to practice the operation, having secured satisfactory results with premature extraction and irrigation.

There is only one point on which there is a general agreement, and that is, regarding the question of determining in what cases we shall not wait for maturity.

With one exception, all believe that, under the circumstances to be mentioned later, either an immature cataract should be extracted or a preliminary ripening operation performed; but Fox, in answer to Bulson's questions a year ago, states: "I do not extract immature senile cataracts, for I do not believe in taking the risk of serious secondary complications which nearly always take place, and render the ultimate results unfavorable;" and in reply to my question as to whether or not he ever performs the ripening operation, he states: "I do not," but modifies this statement, in answer to the question: "Under what circumstances would you perform the operation," by saying: "Only when the nucleus is translucent or sclerosed, and it becomes imperative to obtain better vision quickly." He further says: "It is always dangerous to operate on an unripe cataract. The early removal of an unripe cataract leads to a great deal of trouble."

The methods which have been devised for the purpose of ripening an immature cataract, are:

1. Puncture of the anterior capsule combined with iridectomy (Mooren, 1858).
2. Puncture of the capsule combined with trituration (Rhomor, 1886).
3. Preliminary iridectomy with trituration through the cornea, indirect trituration (Forster, 1881).
4. Trituration after simple paracentesis without iridectomy (T. R. Pooley⁶ operated on rabbit, 1885, and soon after J. A. White operated by this method on a human being).
5. Paracentesis, with or without iridectomy, and direct trituration on the anterior capsule (Ricaldi, 1888, and Bettman, 1892).

From investigation it appears that the last two methods are practiced to almost the same extent. Two operators, Dr. J. A. White and Dr. Edward Jackson, however,

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

1. Weeks: "Treatment of Immature Cataract," *THE JOURNAL A. M. A.*, p. 955, Sept. 30, 1905; also de Schweinitz: "Immature Cataract and Its Treatment," *THE JOURNAL A. M. A.*, p. 1467, Dec. 8, 1906.

2. Bulson: "The Extraction of Uncomplicated Immature Senile Cataract," *THE JOURNAL A. M. A.*, Sept. 23, 1905, p. 905.

3. Ayres: "Artificial Ripening of Cataract," *Cincinnati Lancet-Clinic*, Oct. 10, 1896.

4. "Diseases of the Eye," 1906.

5. Boerne Bettman: "Ripening of Immature Cataracts," *Ann. of Ophth. and Oto.*, Jan., 1893.

6. Pooley: "A Modification of Förster's Method of Artificially Ripening Cataract," *N. Y. Med. Jour.*, Dec. 26, 1885.

practice exclusively and with great success, the method of Pooley. Knapp considers needling the capsule or direct trituration the only efficient method.

Operators of experience disagree regarding the selection of the method of Forster or Bettman. Ayres, Wilder, Prince, Wescott, and others prefer the former. Wilder is strongly opposed to direct trituration, having had two serious results following this method, but Colburn, Ball, Weeks¹ and others prefer it to trituration outside of the cornea.

THE SAFETY OF TRITURATION OF THE LENS.

Considering the large number of operators who have performed this operation, the number of cases in which ill results have occurred have been very few. Only three are reported in which loss of life resulted, and two of these might be excluded, because one proved to be an unfavorable case (Wilder's), and the other was due to iris prolapse and infection (Colburn's). In one there was so much reaction that later it became necessary to remove the eye. This was Wilder's case, in which he did trituration directly on the capsule, "which, however, was found to have a choroiditis, together with posterior staphyloma, so that it would not have been a favorable case for any kind of intraocular operation." Baker's case was one of glaucoma, in which the eye subsequently had to be removed on account of pain.

There have been a number of cases of iritis, but no cases in which ultimate poor vision resulted, though Wadsworth feels that vision was not so good in some cases (Wadsworth, Callan, Reynolds, Hansell). Four cases of glaucoma were reported, one each by de Schweinitz¹ and Griffin, both ending well, likewise another by Donovan, in which it became necessary to remove the lens. Posey had a case in which he suspected retinal detachment, but if so, it was cured by rest in bed, and the ultimate results were good. With very few exceptions, operators who have had experience do not regard the operation as unsafe in uncomplicated cases.

THE EFFICIENCY OF THE OPERATION.

A study of the opinions expressed shows that the operation is most effective in ripening senile cataracts when a hard nucleus is present and it is in just such cases that the operation would be most needed, but that it is entirely ineffective in young people, and in cases of soft cataract. This is expressed by Dr. Edward Jackson,⁷ who practiced Pooley's method. He says: "In the matter of efficiency, my experience indicates that indirect massage is efficient only in senile cataract, that is, only when the opaque lens contains a rather large, firm nucleus." Dr. J. A. White⁸ has had some success with the same method in cases of cortical cataract, though he has had to resort to a repetition of the operation in two cases. He also states, however, that the operation is most successful when a hard nucleus is present, which, he says: "Acts as a base on which to crush the cortex." Several operators express some dissatisfaction, i. e., inability always to secure ripening, but do not stipulate the character of cases. Weeks says: "I have not found that the lens substance escapes more readily after the ripening operation than when the immature cataract is extracted," and Knapp, Lewis, Bull and Hubbell make similar complaint of failure in some cases. These, however, are exceptions, and there is not much complaint on this point.

7. Jackson: "Indirect Massage of the Lens for the Artificial Ripening of Cataract." N. Y. Med. Jour., Oct. 28, 1893.

8. White: "Remarks on Immature Cataract and the Rest Method of Hastening Maturity," Ann. of Ophth., 1892, vol. xxi, No. 4.

TIME REQUIRED FOR RIPENING.

From one to four or five weeks are necessary, according to most of the opinions expressed, but extraction is not practiced usually for ten weeks.

It would seem that a second operation for membranous cataract is not required so often after extraction following a ripening operation, as after extraction of immature cataract, though many operators state that they do not think there is any difference in this respect.

OBJECTIONS TO THE OPERATION.

It does not appear that the objections to the operation by those who have had experience and do not commend it arise from ill results, as these have been comparatively rare, but rather because it is believed by many that an immature cataract can be removed as easily as an artificially ripened one, many believing that the trituration thickens the capsule and causes it to adhere to the lens substance.⁹ One operator (Bulson²), who prefers the extraction of immature cataract, and presented a paper on this subject before this section a year ago, believes that this is the only place for the ripening operation, i. e., "unless patients having immature cataracts, should, from nervousness or other reasons, give the operator a feeling that but little manipulation at the time of extraction should be employed."

An immature cataract can sometimes be well removed after the age of 60, and even before that time if it is not very immature, but without irrigation before that age, and often after 60, considerable cortical matter is apt to remain, to cause much trouble later with iritis and membranous cataract. The enthusiasm with which those who practice irrigation in cases of extraction of immature cataract (with the apparatus of Lippencott, Carrow or Reik) leads one to believe that it is of great value under such circumstances. Carrow practices irrigation in all cases, ripe or unripe, and extracts "when ever the patient loses reading ability."

Some object to trituration on the ground that it means an extra operation, and this is valid where it is not required, in those cases in which an immature cataract can as well be extracted; but, on the other hand, some operators often perform preliminary iridectomy, which also is an extra operation. Thompson, of Indianapolis, advises preliminary iridectomy in all cases in which for any reason there is doubt regarding successful results. Weeks still practices trituration occasionally when he does a preliminary iridectomy, evidently believing it to be an aid, but not of enough value to warrant the extra operation unless preliminary iridectomy is to be performed.

CONTRAINDICATIONS AND INDICATIONS.

In no case of immature cataract would operative measures be resorted to when the patient had sufficient vision in the other eye. No definite degree of loss of vision can be defined in exact figures, for other things have to be taken into consideration in deciding the advisability of the removal of, or ripening of, an immature cataract. The slow and equal development in both eyes, of central cataracts; the loss of ability to earn a livelihood when dependent on the same, and especially when others, too, are dependent; the unhappiness which may result to the patient and those about him; and the general and local conditions have to be considered.

I have been in the habit of performing the Förster

9. Crumb: "A Unique Point in Removing the Soft Lens Matter from the Capsule of an Unripe or Over-ripe Lens." Amer. Jour. of Ophth., March, 1899.

operation in uncomplicated cases of immature senile cataract having much soft cortex (recognizing the fact that many lenses are hard, even though not opaque, particularly in patients over 60), and in those patients having two eyes with slowly maturing cataracts and poor vision, enough to interfere with earning ability or to cause the patient unhappiness. This has been done with satisfaction. In no case has a secondary operation been necessary, and in all cases good results have followed, but I am not prepared to say that equally good results might not have followed extraction with irrigation, though I am sure irrigation would have been necessary. As an example the following case is reported.

Patient.—A. T., male, aged 54, came under the observation of one of my patients, who elicited the following facts:

History.—The man had been a barber, supporting comfortably a family of six, up to two years previous, when his sight became so poor that he was obliged to seek other work. He took up the making and peddling of candy, and left his small home town to come to the city. He was not able to earn more than enough to support himself, and his wife was supporting the remainder of the family by taking in washing. He demurred at coming to see another oculist, as he had seen several, and had been told that he would have to wait for his cataracts to mature.

Examination.—Showed nuclear cataracts, just about the size of his pupils, equal in the two eyes, and vision 10/200, improved but little with a mydriatic.

Treatment.—The patient was advised to have a ripening operation, and the risks were explained. He consented gladly, and a preliminary iridectomy was performed on one eye, with careful trituration outside of the cornea. Three weeks later, the lens, being entirely opaque, was removed, a small amount of cortex remaining. Only slight reaction took place.

Result.—He left the hospital two weeks later and soon went home. In three months he returned and was fitted with glasses, giving 20/30 vision. I saw him some months later, and the other lens showed no further development of the opacity. He has returned to his trade, and is able to support his family.

The details of this case are recorded as it furnishes a good example of the circumstances which make it practically imperative that some such procedure should be practiced for humane reasons.

It is evident that the operation is not to be commended in cases complicated with high myopia, choroiditis, or other inflammatory conditions, nor in cases predisposed to glaucoma, nor where adhesion to the iris is present. Nor is it necessary where a cataract is nearly mature, nor in cases of patients over 60, when the cortex is apt to be of such consistency that it may be removed without much difficulty. In such cataracts the cortex may appear translucent, or amber-colored. Nor would it seem necessary in the case of well-behaved patients, when irrigation is used by an operator experienced in this practice. In this matter, I do not speak from experience, for I have not yet practiced irrigation, but I judge from the favorable comments made by colleagues whose judgment I respect, and the fact that the method is gaining in favor despite opposition formerly expressed.

CONCLUSIONS.

If, therefore, we grant the success and safety claimed by those of much experience in irrigation, the operation of ripening is indicated. 1. In case of immature cataract (not mentioned as contraindicated), in which a preliminary iridectomy is to be performed. 2. In those patients who would not be likely to behave well during the extraction, thus preventing the operator from performing much toilet or from practicing irrigation.

If irrigation is not practiced, trituration of the lens would be indicated in all patients with immature senile cataract under 60, in whom for reasons mentioned, relief is required.

Questions asked were:

1. Do you ever perform the ripening operation in the case of immature senile cataract?
2. Have you had any ill results from the operation; if so, of what nature?
3. Under what circumstances would you perform the operation?
4. If you do not perform the operation, what are your reasons? Are they based on your own experience?
5. Have you secured as good results after extraction following the ripening operation, as after extraction in the case of very immature senile cataract?
6. Do you find from actual experience that an operation for membranous cataract following extraction is required as often when the ripening operation has been performed, as after extraction of a very immature cataract?

OPINIONS OF PROMINENT OPERATORS.

HERMAN KNAPP, New York: I regard external trituration as efficient, and practice internal trituration or needling the anterior capsule at different places and use irrigation following extraction, but all of the ripening methods are more or less unsatisfactory; their shortcoming is insufficiency. Experience with the ripening operation has made me more conservative than I was formerly. I approve and do an artificial ripening of immature cataract (in selected cases), but prefer to let the cataract ripen naturally.

J. E. COLBURN, Chicago: 1. Yes, usually with preliminary iridectomy, direct massage (Bettman), followed in about ten weeks by extraction. 2. None that could be attributed to the procedure. One failure in 47 cases, due to prolapse of iris and secondary infection. Two cases of iritis, making good recovery. 3. When both eyes are involved, sufficient to prevent useful vision, and in monocular amblyopia. 5. Yes. 6. Yes, rather thick in some cases.

S. C. AVRES, Cincinnati: 1. Yes. 2. No. 3. When the opacity of both lenses was advancing about equally. 4. I never recommend the operation unless the perception and projection are good, and the eyes apparently healthy. 5. I never extract "very immature senile cataracts." My results after trituration have been very satisfactory.

A. B. PRINCE, Springfield, Ill.: 1. I frequently make a preliminary iridectomy in immature cataract, and use extraocular massage of the eye, after the iridectomy is completed. 2. I never had, to my knowledge, any unfavorable result which I can attribute to this operation. 3. I perform the operation usually in cases of middle life, where, from any cause, it is desirable to hasten the time of extraction. 5. I think the results are satisfactory after the ripening operation. 6. I consider the question of whether a membranous cataract is more liable to follow, to depend on the thoroughness with which the irrigation has been carried out. If considerable cortex is taken into the capsule, a membranous cataract would be liable to follow.

J. MOORES BALL, St. Louis: 1. Yes, frequently. 2. No. 3. In cases of slowly maturing binocular cataract. 5. Yes. 6. I am unable to say. I performed a number of these operations in the last fifteen years. I am partial to preliminary iridectomy. In nearly all cases in which I make a preliminary iridectomy I also triturate the lens directly, the so-called method of Bettman. I have done thirty or forty of these operations.

H. V. WÜRDEMANN, Milwaukee: 1. Yes. 2. No. 3. Slowly progressing lenticular opacities in both eyes of active adults under 60 years of age. Over that age the lens is sufficiently hard to permit of successful extraction, even though nearly clear. 5. Yes. 6. I endeavor (a) to extract lens in capsule; (b) failing in that, I make large capsulotomy with forceps; (c) I use lavage to remove lenticular debris, and hence, in recent years have much smaller percentages of secondary capsulotomies.

FRANK ALLPORT, Chicago: 1. Yes. 2. No. 3. When patient is blind in both eyes, but neither lens is ready for operation. Still, I prefer to operate on an immature cataract, rather than to ripen one artificially. 5. Yes.

C. D. WESCOTT, Chicago: It is my custom to do a preliminary iridectomy in all cases of immature senile cataract in which I operate. After making the coloboma, I usually stroke the cornea a number of times with the spatula, making sufficient pressure to bring it in contact with the anterior surface of the lense. A few times I have introduced the spatula into the anterior chamber, stroking the anterior capsule directly where it was necessary to use the instrument to replace the pillars of the iris. I believe that the ripening of the cataract is hastened by the iridectomy alone, and still more so by the procedure which I have described, although it can not be proved. My results have been satisfactory. I can not say that the operation for membranous cataract following the extraction is influenced by the procedure.

W. B. MARPLE, New York: 1. Only occasionally. 2. I have had no ill results. 3. I perform it less and less frequently and have not done it on any private patient. 4. In the nuclear cataract or sclerosed lens I get perfectly good results, even when vision is still good. If I had a patient whose vision was much impaired in each eye, from ordinary senile cataracts (not sclerosed lenses) which were immature, I would not hesitate to perform a ripening operation, but not if one eye was fairly good. 5. Yes. 6. I have seen no especial difference, as I use irrigation of anterior chamber rather freely.

GEORGE C. HARLAN, Philadelphia: 1. I have done it in a few cases. 2. No serious results. 3. When opacification is excessively slow, and vision is not sufficient to earn a living. 5. Better. 6. Experience too limited to decide.

H. GIFFORD, Omaha: 1. Yes, a dissection. 2. I have twice had an infection of the lens, one with final good result and one with bad result. Both these cases were in old people. I now do preparatory dissection on people under 50 years of age. 3. When in patients under 50 something has to be done to an unripe cataract, or allow the patient to go on indefinitely with poor vision. 5. About the same. 6. I think more often.

LUCIEN HOWE, Buffalo: 1. Yes, occasionally, Rhomer's method. 2. No. 3. Only when the condition of the other eye makes some such hastening essential. 5. About the same. 6. No difference ever observed. I must add, however, that it is still a question in my mind whether this or any other of the ordinary ripening operations does really ripen, at least, in the majority of cases.

S. THEOBALD, Baltimore: 1. Yes. 2. No, except at times a little rubbing off of the pigment from the posterior surface of the iris, near the pupil, and some iritis, more than would follow a simple iridectomy. 5. Better results. 6. I do not.

DUNBAR ROY, Atlanta: 1. Occasionally. 2. None. 3. In cases of preliminary iridectomy. 5. Yes. 6. It is not required as often.

H. F. HANSELL, Philadelphia: 1. I have operated in several cases of young senile cataracts, those developing in individuals under 50 years of age. 2. Yes, iritis. 3. In the circumstances mentioned under No. 1. 5. Yes. 6. I have found no difference.

EUGENE SMITH, Detroit: 1. Seldom. 2. No. 3. To enable patient to work when necessary to support family. 5. Yes, though greater danger of iritis. 6. Yes.

CHARLES A. OLIVER, Philadelphia: 1. Yes. 2. No. 3. Long-standing, uncomplicated (particularly unclear) cases. 5. Yes. 6. No.

WILLIAM CHEATHAM, Louisville: 1. Yes, iridectomy with massage on cornea of capsule. 2. No. 3. Any reason necessitating an early operation more often in those cases in which both cataracts are progressing evenly. 5. Yes. 6. Yes. My experience is not large enough for my statistics to be of much value.

N. M. BLACK, Milwaukee: 1. Yes, occasionally. 2. No. 3. In cases when there was some clouding of the lens sufficient to interfere with vision in a patient who needs to use eyes for purpose of carrying on his business. 5. Practically no good, I think. 6. Can not say.

LYMAN WARE, Chicago: 1. Yes. 2. No. 3. In cases of binocular cataract, when necessity compels use of eyes. 5. Yes. 6. Have no data, but think not.

J. H. CLAIBORNE, New York: 1. Yes. 2. No. 3. In slowly growing cataracts, chiefly in myopia, and in persons who can not afford to wait. 4. Yes. 5. Yes. 6. Yes.

C. R. ELWOOD, Menominee, Mich.: 1. I have not. 3. When both eyes were about equally advanced and ripening slowly, or probably if only serviceable eye was cataractous and ripening slowly. 4. I believe natural ripening safest, and my patients have happened to have one eye much more advanced than the other, or one lens ripe, when presented. 6. My experience has been only after natural ripening. With slowly ripening cataract in patient's only eye, I would do a preliminary iridectomy, and at the same time very carefully massage lens.

HORACE M. STARKEY, Rockford, Ill.: 1. Yes, the Forster operation as modified by Bettman. 2. No. 3. When vision is reduced in each eye by small, non-progressing or slowly progressing central opacities. 5. Yes, or as in mature senile cataract. 6. Have observed no difference.

A. E. BULSON, JR., Fort Wayne: 1. Yes, in the few instances in which I have performed preliminary iridectomy before cataract extraction. It is my opinion that preliminary iridectomy alone, without trituration, will hasten maturity of cataract. 2. No. Once had considerable swelling of lens, but it did not prove serious in results. 3. In the few instances in which preliminary iridectomy was indicated. In nervous patients, in whom manipulations to extract immature cataract might be disastrous, and seldom, if ever, in patients beyond 65 years of age, as there are no advantages to be obtained in such cases over extraction of immature cataract. 4. I do not believe advantages, taking all risks into consideration, are more than in extraction of immature cataract under proper conditions (combined operation, irrigation, atropin, etc.). 5. Yes, have only very few cases in which ripening operation was performed. 6. My experience is limited, but would say yes. I have not attempted the ripening operation except in a very few cases, and in all of those I started out to do a preliminary iridectomy with the intention of making extraction later. My experience has been that a preliminary iridectomy alone is sufficient in most cases to hasten the maturity of a cataract. Therefore, inasmuch as I do an iridectomy in all cataract extractions, it occurs to me that preliminary iridectomy is all that is indicated in case the operator does not care to undertake the extraction of an immature cataract by the combined operation. I have had such good results from the extraction of immature cataract that I have not given much thought to the value of the ripening operation, but I believe there is a place for the ripening operation, and I would probably prefer to use the operation, if used at all. In those patients having immature cataracts, who, from nervousness or other reason, give the operator a feeling that but little manipulation at the time of the extraction should be employed.

J. L. THOMPSON, Indianapolis: 1. The only perfectly safe ripening operation for immature senile cataract in my opinion, is a preliminary iridectomy. 2. I have never met with any ill results from this operation. 3. It is called for in cases of nuclear cataract in both eyes, when the acuity of vision is not sufficient for one to read large print, when the patient becomes tired of waiting, as he frequently has to do, for many years. 5. By this method I obtain better results than when I do iridectomy and extraction of the lens in one operation. 6. Fewer cases of thickened capsular threads are met with after this preliminary operation.

J. E. WEEKS, New York: 1. I have performed it, but do not do it now, except in cases in which I perform a preliminary iridectomy directly on the anterior portion of the lens capsule. 2. No, but I have not found that the lens substance escapes more readily, after the ripening operation than it does when the unripe or immature lens is extracted. 3. None, except when preliminary iridectomy was performed. 4. I have not found it to be of sufficient value to make it worth while. My opinions are based on personal experience. 5. About the same. 6. Yes.

S. D. RISLEY, Philadelphia: 1. I did so in a considerable series of cases, but abandoned the operation. 2. Never had any immediate ill results from inflammatory reaction. 3. I would not perform it under any circumstances. 4. My experience very soon taught me, or seemed to teach, that the difficulties of extraction were enhanced. The cortex seemed glued to the capsule, and the capsule itself tough and gray, in cases in which the cortex became opaque after trituration. In cases in which this did not follow, the lens, when amber colored or translucent, was found already

hard, and operation therefore was unnecessary. 5. My results after ripening were no better; I think not so good. 6. I have no compiled statistics on this point, but my impression is that it is required as frequently and is usually more difficult because of greater toughness of capsule. I did the ripening operation in 25 consecutive cases of immature cataract, most of them by direct trituration of the capsule, some of them by the method of Forster, but I had such discouraging results in the subsequent extractions as compared with the results obtained in the case in which the operation had not been done, that I was quite glad when I was through with them, and have never ventured on it since. This was about ten years ago. I do not think the operation is to be commended.

GEORGE E. DE SCHWEINITZ, Philadelphia: 1. Not often. 2. Once only, in secondary glaucoma from swelling of lens, the ultimate result was perfectly good. 3. In very slowly maturing central cataracts with much clear cortex in patients under 50. 4. It is best to wait for maturity, but no serious objections to removal of unripe cataract after 60, and do not advocate ripening operations. 5. Yes. 6. Yes.

W. H. WILDER, Chicago: 1. In certain cases I perform preliminary iridectomy, and at the same time practice massage of lens through the cornea, according to method of Forster. I never triturate the lens with an instrument pressed into the anterior cornea, as I used to do occasionally. 2. With two cases treated with anterior cornea trituration I had very serious results. In one of these there was violent reaction that fortunately subsided. In the other the reaction was so violent that the resulting iridocyclitis necessitated removal of the eye, which was found to have a choroiditis, together with posterior staphylocoma, so that it would not have been a favorable case for any kind of intraocular operation. 4. The reasons given above have influenced me against performing the operation, for I would rather operate on an immature cataract and do a subsequent needling operation. 5. I am unable to judge. 6. I can not say.

T. R. POOLEY, New York: 1. I formerly did, but not now. 2. No. 3. None. 4. It is safer and better to wait, and the operation is easier and safer. 5. Yes. 6. I do not know; I have kept no statistics on this point.

O. F. WADSWORTH, Boston: 1. I have done so, not often, and not of late years. I presume you refer to massage after evacuation of aqueous. 2. Iritis, with posterior synocha, etc. 4. In part, I think the dangers from the operation at least as great as those which immaturity adds to the ordinary cataract operation. 5. In some instances, yes. 6. No.

A. A. HUBBELL, Buffalo: 1. Not for eight or ten years. Before that I practiced it considerably. I did a small iridectomy, and then with the elbow of a strabismus hook trituated (kneaded) the lens through the cornea. 2. None whatever. 3. None. 4. Yes, my own experience. I gave it up because the ripening did not always take place, especially when the opacity was nuclear, because the trituration or kneading affected only the anterior portion of the lens, but more particularly because removal of immature cataract without the ripening process gave just as good results. 5. Yes, but no better. 6. Yes.

C. S. BULL, New York: 1. I formerly did, but for some years have given it up. 2. None but failure to succeed, and in several instances the manipulation caused partial disappearance of the opacity. 3. This question is practically answered under No. 1. 4. This question is practically answered under No. 2. 5. No. 6. Fully as often.

O. DODD, Chicago: 1. No. 2. No serious results myself, but have seen very serious results from the operations I have witnessed by others. 3. Not at all. 4. In my experience it has been of no benefit, as the lens does not come out more easily or completely than without it. It is necessary to wait some time after operation before extraction can be done, and had rather do extraction and wait after for cortex to clear. 5. Yes, in the few cases I have done. 6. I think so, but my experience is not large enough to say.

E. E. HOLT, Portland, Maine: 1. No, not in recent years. 2. No. 4. My reason, take it all in all, is that it is better to perform the regular operation. 5. Yes, in the few cases in which it was employed years ago. 6. Not sufficiently to state.

P. A. CALIAN, New York: 1. I formerly did the operation, but not for several years. 2. Yes, iritis. 3. I should rather extract the immature cataract, having made a preliminary iridectomy. 4. I get better results from a preliminary iridectomy, as my results from the ripening operation were not satisfactory. 5. About the same. 6. Very little difference.

C. J. KIPP, Newark: 1. Not now. Years ago I did several, but as they failed to hasten the ripening materially, I have given up the operation. 2. No. 5. Yes. 6. Yes.

H. D. BRUNS, New Orleans: 1. Which operation? I have done iridectomy and trituration without much, if any, effect, often. Tried discission many times, years ago, with too much effect. 2. Senile eyes, on which discission has been performed, do not quiet down readily, and one has usually to do the extraction in an eye not entirely healthy. My experience is that the slightest pathologic condition, sometimes one which we hardly believe to have any importance, militates against perfect success in the extraction of senile cataract and the final result. I would rather take the chances of operation on a very unripe senile cataract, using lavage if necessary, if driven to it by humane motives, than risk discission and subsequent extraction. From trituration after preliminary iridectomy. I am not sure that I have seen any result. I write entirely from my own past experience.

O. A. GRIFFIN, Ann Arbor: 1. I did formerly, but rarely now. 2. Yes, an acute glaucoma, but it ended well. 3. When cataract exists in each eye, is partially matured, and the process has become stationary. 4. Have extracted immature senile cataracts in few cases without ripening, and obtained good results. 5. Yes, but not better, as stated above. 6. Have not sufficient data on this point.

A. R. BAKER, Cleveland: 1. Yes, formerly. 2. Yes, iritis two or three times, and glaucoma once. 3. I would not perform operation, except in patients under 45 years of age. 4. More satisfactory results are obtained by extracting immature cataracts, first making preliminary iridectomy and extracting immature lens, two or three weeks later, with preliminary capsulotomy. 5. No.

M. BLACK, Denver: 1. No. 3. I really can not conceive of any condition which would cause me to subject the patient to this unnecessary operation. 4. I believe the lens of a patient which is sufficiently opaque to demand extraction at all is hard enough to remove without preliminary ripening. If any doubt remains as to the cortical substance being all removed, anterior chamber irrigation should be practiced.

H. M. POST, St. Louis: 1. I performed the operation several times fifteen or twenty years ago. I have not done it since. 2. No. 3. I do not now think of any. 4. Under antiseptic precautions I do not hesitate to perform extraction with an iridectomy, as soon as the difficulty in reading is serious. I have had excellent results in such cases.

E. C. ELLETT, Memphis: 1. I do not do it now, though I have done it a few times. 2. No. 3. I would as soon extract an immature cataract as to do the operation. 4. I regard it as unnecessary. 5 and 6. Too few cases to say.

J. M. RAY, Louisville: 1. I did up to the last five or six years. 2. None, except I think that the massage produces adhesions of lens substance to capsule, and therefore the lens sticks and is more difficult to get out of capsule. 3. Only when there is one eye, and if I did a preliminary iridectomy I might massage the lens. 4. As given above, and from experience, I found myself less inclined to the operation, and more inclined to remove a semi-transparent lens. 5. I have no statistics on subject at hand. 6. While I have no exact data, I should think just as often.

C. A. VEASEY, Philadelphia: 1. No. 2. Difficulty in extracting the ripened lens, which is apt to adhere and to require greater pressure. There is more severe reaction. 4. As stated above, difficulty in expelling the lens, because of adherence, more frequent loss of vitreous delivery and more severe inflammatory reaction. 5. No. 6. I have not noticed any difference.

D. S. REYNOLDS, Louisville: 1. I have abandoned all ripening operations as unsatisfactory and unnecessary. Extraction of immature cataract is more satisfactory, because it saves time and avoids the complications of iritis, etc. 2. Yes, iritis frequently; opaque capsule; in two cases, cyclitis. 3. I formerly did it when both eyes were unable to read and neither mature. 4. Yes, as stated above. 5. Sometimes. 6. Yes.

A. BARKAN, San Francisco: The only operation for ripening cataract done in a normal eye, if slowly developing nuclear cataract, was an iridectomy. The cornea was very gently smoothed out by means of the strabismus hook. Reaction was very great. Iritis and slight cyclitis followed, and the case never came for operation subsequently. I have never since then done a truly ripening operation of immature or senile cataract. The preliminary iridectomy I have done repeatedly, especially when one eye was at stake, and with no results so far as ripening was concerned, but facilitating and rather helping to secure good results when the time for extraction came on the other eye. I am opposed to this measure on the grounds of conservative surgery, and think the massage, if done at all efficiently, is likely to be extended through the lens proper to the surrounding uveal membrane. I would certainly object to these operative proceedings on my own eye.

F. PARK LEWIS, Buffalo: 1. Of late years I have entirely given up the ripening operation. 2. In many cases it did not prove satisfactory. Ripening did not seem to be hastened in some instances; on the other hand, it seemed to retard the process of opacification. It moreover thickened the capsule and made it more unruly for subsequent management. 3. I doubt if any. 4. The reasons are as given as above, and are wholly based on my own experience. My reasons for not employing artificial ripening are that I believe that with normal salt irrigation or extraction in the capsule it is possible to get better results in the case of an unripe lens than that which follows when the capsule has been thickened by trituration. 5. My impression is that I have. I have not, however, made statistical comparison. 6. More so, with the same qualification as above.

WILLIAM CAMPBELL POSEY, Philadelphia: 1. Prior to five years ago I did several ripening operations for cataract, but I have given up the operation. I have found that I secured as good results in operating on immature cataracts without previous ripening, as I did when this operation was performed. 2. In one case, in which the lens was directly tritured, I think I obtained a detachment of the retina, as the tension became much diminished, and I feared for a time that the eye would be lost. Under treatment for detached retina, i. e., rest in bed with a pressure bandage, the eye finally gained its normal tension, the lens was removed and the patient obtained good vision, which has been retained for four or five years. I believe that the procedure of washing the anterior chamber after the removal of an immature lens has done away with the necessity for the preliminary ripening procedure.

D. T. VAIL, Cincinnati: 1. I have done so a number of times. 2. No, bad results, in some cases the cataracts were not influenced. 3. None. 4. Yes. I find I can extract without, and the ripening is unnecessary, also that it is not at all reliable. 5. About the same, but hard to judge; each case is its own rule. 6. Yes, all had to be discussed.

FLEMING CARROW, Detroit: 1. I never perform a ripening operation in cases of immature senile cataracts. I remove the lens as soon as the patient begins to lose reading ability. I might say that in the last three or four years I always remove the lens when the patient loses reading ability. I do this because in such cases I have a little instrument with which I wash out the anterior chamber. Knowing that in cases in which the lens is immature, there is more or less of the lens debris left. To put it plainly, I always remove the lens, and I always wash out the anterior chamber after removing it. I do this, whether the lens is hard or soft, diabetic or otherwise.

WILLIAM ZENTMAYER, Philadelphia: 1. No. 4. Because in the exceptional cases in which it might have been indicated I have not hesitated to remove the lens, either after a preliminary iridectomy or with iridectomy at the time of extraction. 5. Not having done the ripening operation, I can make no comparison, but the results after the removal of unripe cataract have been satisfactory.

H. B. YOUNG, Burlington, Iowa: 1. Have done it once only. 2. No trouble of any kind. 3. Governed by the needs of immediate vision. 4. With Reik's flushing apparatus, I would about as soon extract the immature cataract. 5. In my one case, quite as good. 6. My patient was from a distance and I did not see him again.

A. J. DONOVAN, Butte, Mont.: 1. No. 2. A few years ago I had a severe reaction, increased tension and had to remove lens. Since then I prefer to do it at once, as I consider the risk to be less. 4. Yes, if the patient consents, I remove cataract as soon as vision is not useful. I always wash out the anterior chamber with boric-acid solution, and so far I have never had a single case in which I had cause to regret it.

G. C. SAVAGE, Nashville: 1. No. 2. I have never attempted it. 3. Under no circumstances. 4. For the reason that an immature cataract can be removed easily. 5. I have never done the former. 6. After any operation that does not include the removal of the capsule, the latter, sooner or later, becomes opaque.

H. B. ELLIS, Los Angeles: 1. I do not. 2. No. 4. Poor results in hands of others—no personal experience.

W. H. HULEN, San Francisco: 1. No, I prefer to extract the immature cataract in all the cases that have come to me, and, so far, my experience has been favorable in such cases.

F. B. EATON, San Francisco: 1. No. 3. Under 60 years of age in double cataract (uncomplicated) when vision in each eye was too low for earning a living and for endurance. 4. Rarity of my cases below 60 years and my fear of uveal trouble. They are not formed on my own experience.

MARK D. STEVENSON, Akron, Ohio: 3. In very immature, uncomplicated cataract in a patient from 30 to 40 years of age, when the vision of each eye is insufficient for the patient's common needs and vocation. 4. I avoid as much as possible the ripening operation for the following reasons: 1. At least two operations requiring opening of the eyeball are required, and of capsulotomy, with attending dangers. 2. If ripening is not performed, only one operation is sometimes needed, and two at most. 3. The danger of glaucoma. 4. Others have told me that the cortical matter is more sticky and is removed with greater difficulty after ripening. Personally, I can not say as to this.

LEARTUS CONNER, Detroit: 1. No, as it has not impressed me as helpful, while the extractions of such cataracts remained satisfactory. 2. I never did the operation. 3. I do not know any circumstances. 4. I think that there is less risk in immediate extraction. My results from this operation have been so satisfactory that I have no call for artificial ripening. 5. I never made the comparison. 6. I have no experience.

J. A. WHITE, Richmond: 1. Yes, I do this operation both with and without iridectomy—trituration through the cornea. 2. No bad results, except occasionally some iritis. 3. In very slowly developing cataracts, when both eyes are involved, and I do it on one only, and usually only when patient is under 60 years of age. 5. Yes, better. 6. I have not done enough immature extractions to make a fair comparison.

J. O. McREYNOLDS, Dallas: 1. I have done so, but I have about abandoned the procedure. 2. None. 3. I do not favor the operation. 4. My experience has been that the operation secures no material advantages, but increases the number of operations. 5. Yes. 6. About the same.

CHAS. A. MAY, New York: 1. No. 4. No, I do not resort to the ripening operation, simply because I never hesitate to extract the immature cataract when vision is sufficiently interfered with to demand it, especially since resorting to irrigation of anterior chamber in these cases.

LEWIS H. TAYLOR, Wilkesbarre: 1. Practically, no. My experience is so limited with the ripening operation that I can not answer the other questions. I have done no ripening operation except a preliminary iridectomy. 2. No. 3. When a man had not vision enough to perform his work, and needed especially to earn his living. Even then, I think the immature cataract might be operated on, especially with irrigation. 4. It has seemed to me better to wait. I have no adverse opinion based on experience.

F. T. ROGERS, Providence: 1. I have done it frequently up to three or four years ago, when I became convinced that the immature lens could be safely extracted, and since then I have had no occasion to do the ripening operation, although I frequently do a preliminary iridectomy without disturbing the lens. 2. One case of dislocation of the lens. 3. When the vision was so impaired that the usual avocation could not be pursued, but the peripheral changes were not far enough advanced to promise a successful extraction. 5. Yes, save in one case. 6. I have noticed no marked difference.

E. E. HOLT, Portland, Me.: 1. I have not had occasion to do it for years. 2. No. 3. After stating all the facts, and the operation was selected by the patient or his friends. 4. I generally prefer to remove the lens direct. 5. Yes. 6. My experience is insufficient to make a statement.

L. WEBSTER FOX, Philadelphia: 1. I do not. 2. No. 3. Only when the nucleus is translucent or sclerosed, and it becomes imperative to obtain better vision quickly. 4. It is always dangerous to operate on an unripe cataract. The early removal of an unripe cataract leads to a deal of trouble. 5. No. 6. More so, always requires a secondary operation.

GEO. F. SOKER, Chicago: 1. I have not employed it in the last five years in patients at or over 50. If under this age, and both lenses are in the incipient stage and vision is reduced so as materially to interfere with the comfort and occupation of the patient, then I employ Forster's method; but these cases are rare. 2. I have seen iritis follow, also failure to induce hastening or even actual maturation of the lens. 3. Under no circumstances, if patient is at or beyond 50 years of age. See No. 1. 4. At or beyond 50 the lens is readily delivered, even if not in the so-called mature state. In patients beyond 50, see my answer to Dr. Bulson's questions on same topic presented at the Portland Session of the American Medical Association, 1905. 5. Yes, but ripening means the subjecting of the patient to an extra operation, therefore, another hazard. 6. If the capsule is in size peripherally in a line corresponding to the corneal section, capsular cataracts are not so prone to occur. If the anterior chamber is thoroughly irrigated and every effort is made to remove soft substances, capsular cataracts are not more prone to occur than in any other method.

C. H. BEARD, Chicago: 1. Twelve to eighteen years ago I made a number of operations according to the methods then in vogue. I have not tried any of the later ripening measures, such as the salt irrigation of Jock, the hot-air douche of Wolffberg and the rapid method recommended by Bahr at the Lucerne congress. 2. I can not say that I noted any positive ill results. 3. I find no further indications for it, being satisfied with preliminary iridectomy and

the subsequent extraction of the lens, mature or immature, as the case may be. 4. Unwillingness to subject the eye to needless surgery and manipulation. My experience with artificial ripening caused me to conclude that the perplexities of the extraction were in no way relieved by it. The cortex, instead of being loosened from the capsule, seemed to be made more apparent and the extraction more difficult. 5. Certainly the results were not appreciably better. 6. Yes.

C. R. HOLMES, Cincinnati: 1. I did formerly, but do not any more. 2. Never very serious, but some unpleasant results, imperfect ripening requiring a repetition and rupture of the capsule and dislocation of the lens. 4. For the reason given above. 5. I have secured better results by extracting the immature senile cataract without ripening. 6. Not positive as to this point, but as the membrane varies in nearly all cases from a mere film to a dense membrane I needle in nearly all cases, as there is no reason why the transparent media need not be absolutely clear.

R. L. RANDOLPH, Baltimore: 1. No. 2. Nothing more than iritis. 3. Have no confidence in the operation. 4. Have operated, as well as I remember, about twenty times, and succeeded in ripening twice. In nearly all the cases had an iritis. 5. In the two cases, yes. 6. Am not prepared to say.

[THE SYMPOSIUM ON CATARACT, OF WHICH DR. TODD'S PAPER IS A PART, WILL BE CONTINUED NEXT WEEK.]

Clinical Notes

A CASE OF CARCINOMA OF THE SPINAL CORD.

CHARLES LEWIS ALLEN, M.D.

Pathologist and Assistant Physician New Jersey State Hospital at Trenton.

TRENTON, N. J.

While carcinoma of the vertebral column is not so infrequent and may affect the spinal cord secondarily, the growth of a cancer in the cord itself is very rare and when it occurs its point of origin is usually in the meninges. Schlesinger¹ states that carcinoma in the interior of the vertebral canal, with the exception of that growing from the bony structures, is always secondary and very rare and that growths in the cord itself are exceedingly infrequent, having so far been found in cases of general carcinomatosis only. Spiller and Weissenburg,² in a recent review of the subject of carcinoma of the nervous system also speak of the rarity of growths in the spinal cord itself. Among the 11 cases which form the basis of their paper, there were 3 cases of cancer of the vertebral column with a fourth case presenting symptoms suggesting such involvement, which, however, did not come to autopsy, but in no instance was a growth, arising in the spinal cord itself, noted.

The rarity of this condition then and the fact that it was accompanied by secondary changes, which, in the absence of previous history, might make the diagnosis a matter of some difficulty seems to justify putting on record the following case:

Patient.—Female, aged 65 years, a terminal dement, inmate of the State Hospital for 30 years.

History.—During the latter part of the spring of 1905 she was found to have a lump in her left breast. About six months later this broke down and formed an ulcer which would not heal. In March, 1906, it was noticed that she had difficulty in walking, and by the middle of April she could no longer get about. She was first examined by me Aug. 19, 1906, at which time she presented the following picture:

Symptoms.—Patient was much emaciated and bedridden. In the left breast was a tumor about the size of a small orange which had broken down and was discharging ill-smelling pus. Over the sacrum there was a bed sore about four inches in diameter with a gangrenous base, which had involved the bone. The movements of the head and upper extremities were normal. The legs were completely paralyzed, their muscles flabby and atrophied, and in them no reflexes could be obtained. The left leg was much swollen. The middle of the right thigh

measured 11¾ inches, while the left thigh measured 31 inches. The circumference of the right calf was 5½ inches; the left calf, 9¾ inches. The testing of sensation was unsatisfactory owing to the mental condition of the patient, but there was apparently complete anesthesia over both lower extremities. There was complete paralysis of the bladder with retention of urine and dribbling. She died Aug. 21, 1906.

Autopsy.—Thirteen hours after death an autopsy showed the following: Nothing was macroscopically abnormal in the brain. The bed sore over the sacrum had extended to the bone, causing an osteitis of the lower lumbar and sacral vertebrae whose bodies were soft and on manipulation crumbled to a grumous mass. There was necrosis of a considerable portion of the sacral arch on the left side. The spinal dura mater was thickened and pigmented. The cord in the lower lumbar and upper sacral regions was inflamed and softened to a pulpy consistency. The cervical and dorsal regions appeared normal and cross sections showed no gross changes above the softened area. The heart was small, pale and flabby, its valves normal. The lungs showed a few adhesions and were much congested. Distributed throughout both lungs were a great number of cancerous nodules varying in size from that of a millet seed to that of a split pea. The bronchial glands were enlarged. The liver contained a number of cancerous nodules of sizes varying up to that of a small orange. The kidneys were small, hard and contained extensive cancerous deposits. The aorta was much enlarged and there was thrombosis of the left external and common iliac veins.

Microscopic Examination.—Sections from the cerebral cortex

Photograph of cross section of the cord. C, cancerous nodule. I, infiltration of cancer cells.

showed much pigmentary deposit in the cells of Betz of the paracentral lobule and slight thickening of the pia-arachnoid. Sections of the spinal cord showed great thickening with round cell infiltration of the pia-arachnoid in the lower dorsal, lumbar and sacral regions. In the latter location there was extensive necrosis involving a large part of the posterior portion of the cord. This was most intense in the middle and lower lumbar region, the area affected becoming smaller as the upper lumbar region was reached. In the upper lumbar region, extending through less than one segment about the level of the border between the first and second segments, there was a small cancerous mass which had apparently grown from the pia-arachnoid into the anterior fissure. It had compressed the anterior pyramids, interfered with the anterior nerve roots and from it small nests of cells had invaded the anterior columns and anterior horn on one side. The whole cross section of the cord at this level was distorted (See illustration). The nerve cells here and in sections immediately below were swollen, showing intense chromatolysis and loss of nuclei. There was degeneration of the posterior columns extending from the lumbar region to the medulla. This was confined in the dorsal and cervical regions to the tracts of Goll. This degeneration was shown both by the Weigert and by the Marchi methods. The Marchi method demonstrated in the softened area in the lumbar region, diffuse degeneration, involving the whole cross-section of the cord. The cancerous nodule was, in structure, an adeno-

1. Flatau, Jacobsohn and Minor: *Handbuch der Pathologischen Anatomie des Nervensystems*.

2. Jour. of Nerv. and Ment. Dis., August, 1906.