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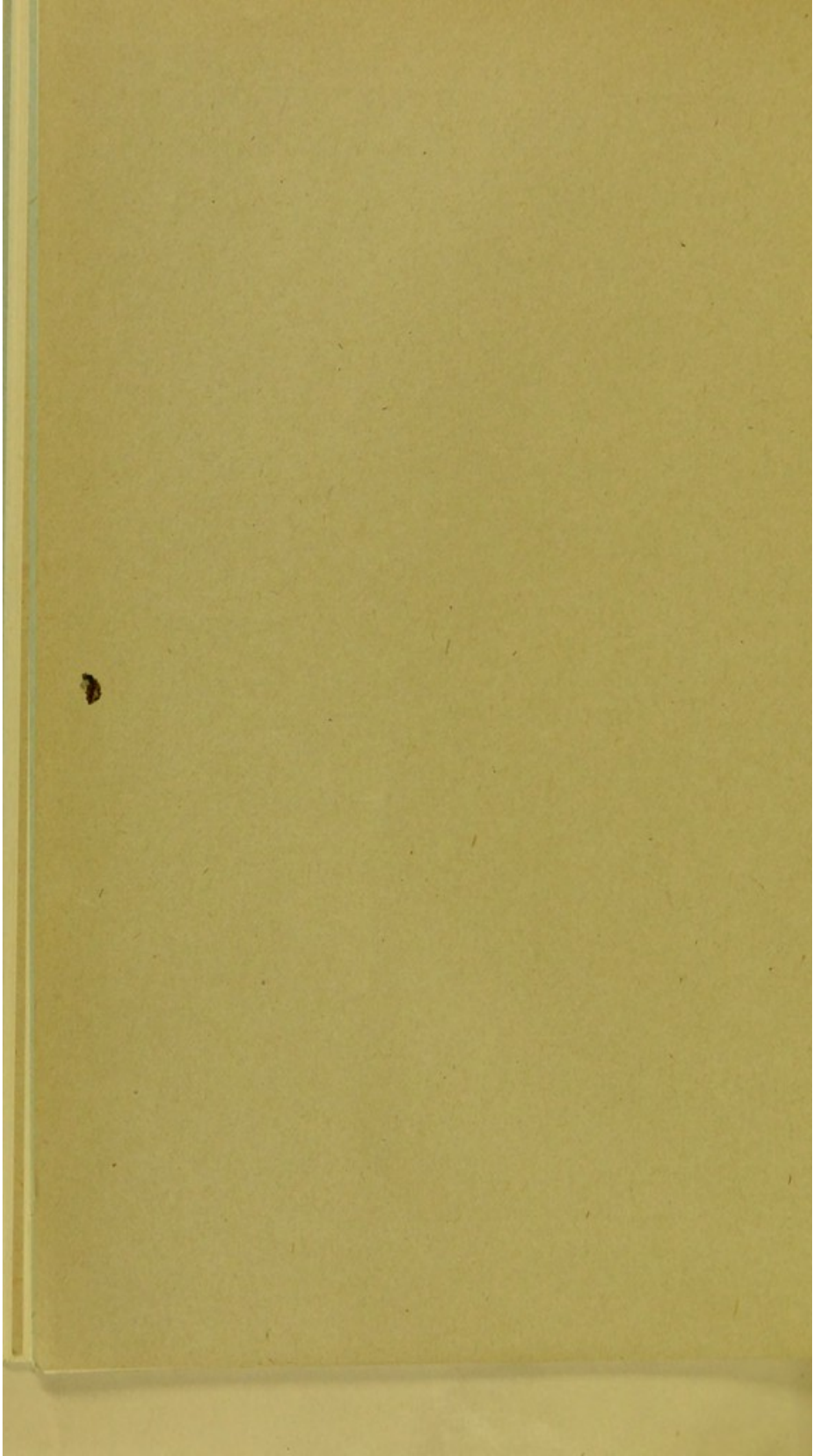
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Sclerocorneal Trephining for Glaucoma

WALTER R. PARKER, M.D.
DETROIT

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SCLEROCORNEAL TREPHINING FOR GLAUCOMA

WALTER R. PARKER, M. D.

DETROIT

This insert includes the records of fourteen additional cases operated by Col. Elliot received after the preessional record went to press. The author's cases are recorded on page 3 of the reprint.

TABLE 1.—SURGEONS REPORTING OPERATIONS BY
COLONEL ELLIOT

Name	No.	Name	No.
Robert Beattie	1	J. M. Ray.....	2
L. W. Callan.....	2	R. A. Reeve.....	5
C. B. Cayce.....	1	Samuel D. Risley.....	1
H. B. Chandler.....	1	E. H. Rowe.....	1
F. E. Cheney.....	1	G. C. Savage.....	3
J. F. Crouch.....	2	George E. de Schweinitz...	2
A. E. Davis.....	2	Wm. H. Sweet.....	1
George S. Derby.....	1	Frank C. Todd.....	18
E. T. Easton.....	2	E. Torok	1
Harry Friedenwald	1	H. H. Tyson.....	1
L. Webster Fox.....	10	Will Walter	1
W. H. Fox.....	1	David Webster & W. H. Giles	2
John Green, Jr.....	4	J. E. Weeks.....	2
W. B. Marple.....	3	W. H. Wendell.....	2
C. B. Meding.....	1	W. H. Wilder.....	3
A. G. Morse.....	1	W. H. Wilder & E. V. L.	
W. R. Parker.....	6	Brown	1
A. O. Pflingst.....	4	W. H. Wilmer.....	3
P. J. Pontius.....	1	F. E. Woodruff.....	1
M. H. Post.....	3		
McCluney Radcliffe	2		

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TABLE 2.—SUMMARY OF OPERATIONS BY COL ELLIOT.

Patients operated on	78
Eyes operated on	100

	No.	Results		
		Good	Poor	Failure
Males, right eye.....	13	9	2	2
Males, left eye.....	13	10	1	2
Total	26	19	3	4
Females, right eye.....	17	11	2	4
Females, left eye.....	13	11	1	1
Total	30	22	3	5
Males, both eyes.....	13	21	1	4
Females, both eyes.....	9	12	3	3
Total	22	33	4	7
Eyes trephined after iridectomy for glaucoma	13	12	1	0
Eyes trephined after iridectomy for cataract extraction.....	4	2	0	2
Total	17	14	1	2

Good results from trephining after iridectomy for glaucoma... 92.3%
 Good results from trephining after combined extraction of
 cataract 50 %

TABLE 3.—NUMBER OF CASES. TYPES OF GLAUCOMA AND RESULTS IN EACH GROUP OF CASES

Type of Glaucoma	Number of Cases	Previous Iridectomy	Without Iridectomy	Complete Iridectomy	Partial Iridectomy	Iritis	Without Iritis	Iritis Not Stated	Results		
									Good	Poor	Failure
Absolute	2	1	..	..	1	..	1	1	1	..	1
Acute Inflamm'y	9	..	..	1	8	3	5	1	7	..	2
Simple	78	9	9	8	48	30	42	6	60	10	8
Secondary	7	5	1	..	1	3	4	..	5	..	2
Hemorrhagic	2	..	1	..	1	1	1	..	1	1	..
Not Stated.	2	..	..	5	1	..	2	..	..	..	2
	100	15	11	14	60	37	55	8	74	11	15

GOOD RESULTS IN DIFFERENT TYPES OF GLAUCOMA

	Number of cases	Per Cent
Absolute	2	50
Simple Glaucoma	78	76.9
Acute Inflammatory	9	77.7
Secondary	7	71.4
Hemorrhagic	2	50
All cases, except simple.....	22	63.6

The classification of results in Table 4 is based on the effect the operation produced on the tension of the eyeball, the data concerning the acuity of vision before and after operation being too meager to justify conclusions.

TABLE 4.—RESULT OF TREPHINING

	Number	Per Cent		
Operations	100	..		
Good results	74	74		

	Number	Good	Poor	Failure	Not Stated
Eyes having had previous iridectomy	15	13	1	1	0
Eyes having complete iridectomy at time of trephining	10	7	0	3	0
Total	25	20	1	4	0
Good results in 80 per cent:					
Eyes having partial iridectomy at time of trephining	60	46	6	8	0
Eyes in which no iridectomy was done...	11	8	0	3	0
Total	71	54	6	11	0
Good results in 76.05 per cent.					

TABLE 5.—CLASSIFICATION WITH REFERENCE TO THE PRESENCE OR ABSENCE OF IRITIS IN CASES IN WHICH A PREVIOUS IRIDECTOMY HAD BEEN PERFORMED OR A COMPLETE IRIDECTOMY WAS DONE AT THE TIME OF OPERATION.

Trephinings followed by Iritis.

	Number	Iritis	No Iritis	Not Stated
Cases having complete iridectomy at time of trephining.....	10	1	7	2
Having had previous iridectomy...	15	2	11	2
Total.....	25	3=12%	18=70%	4
Having no iridectomy	11	8	2	1
Having partial iridectomy.....	60	29	26	5
Total.....	71	37=52.1%	28=39.4%	6
Type of iridectomy not stated	4			
	100			

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Of the twenty-five cases in which an iridectomy had been made, either at time of operation or previously, 12 per cent showed signs of iritis, whereas in the seventy-one cases in which the trephine operation had been performed, without or with a partial iridectomy, iritis was present in 52.1 per cent.

SCLEROCORNEAL TREPHINING FOR GLAUCOMA *

WALTER R. PARKER, M.D.
DETROIT

I. REPORT OF COLONEL ELLIOT'S CASES

At the request of Chairman Todd, and with the consent of Colonel Elliot, I have the privilege of presenting to the members of the Section the results of the sclerocorneal trephining operations for the relief of glaucoma performed by Col. R. H. Elliot during his visit to the United States last fall.

In preparing this report, circular letters were sent out to those for whom Colonel Elliot operated, and reports of cases were received from the surgeons named in Table 1, to whom I wish to express my sincere appreciation for their hearty cooperation.

TABLE 1.—SURGEONS REPORTING OPERATIONS BY
COLONEL ELLIOT

Name	No. of Operations
Robert Beattie	1
F. E. Cheney	1
A. E. Davis	2
L. Webster Fox	10
W. H. Fox	1
P. J. Pontius	1
George S. Derby	1
J. M. Ray	2
R. A. Reeve	5
G. C. Savage	3
Frank C. Todd	18
E. Torok	1
W. H. Wendell	2
W. H. Wilmer	3
E. B. Cayce	1
L. W. Callan	2
E. T. Easton	2
John Green, Jr.	4
A. G. Morse	1
W. R. Parker	6
Samuel D. Risley	1
McCluney Radcliffe	2
William M. Sweet	1
George E. deSchweinitz	2
H. H. Tyson	1
Will Walter	1
F. E. Woodruff	1
Total	76

* Read before the Section on Ophthalmology at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

* A report of the tabulated results of seventy-six operations performed by Col. R. H. Elliot during his visit to the United States, and a clinical study of twenty-seven operations by the author.

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TABLE 2.—SUMMARY OF OPERATIONS BY COLONEL ELLIOT

Patients operated on	61
Eyes operated on	76

	No.	Results		
		Good	Poor	Failure
Males, right eye	9	7	0	2
Males, left eye	9	7	1	1
Total	18	14	1	3
Females, right eye	16	11	2	3
Females, left eye	12	11	0	1
Total	28	22	2	4
Males, both eyes	8	15	1	0
Females, both eyes	7	11	1	2
Total	15	26	2	2
Eyes trephined after iridectomy and glaucoma extraction	11	10	1	0
Eyes trephined after iridectomy for cataract	4	2	0	2
Total	15	12	1	2

Good results trephined after iridectomy90.9 per cent.
 Good results trephined after combined extraction of
 cataract50 per cent.

The classification of results in Table 4 is based on the effect the operation produced on the tension of the eyeball, the data concerning the acuity of vision before and after operation being too meager to justify conclusions.

TABLE 3.—NUMBER OF CASES, TYPES OF GLAUCOMA AND RESULTS IN EACH GROUP OF CASES

Type of Glaucoma	Previous Iridectomy	Without Iridectomy	Complete Iridectomy	Partial Iridectomy	Iritis	Without Iritis	Results		
							Good	Poor	Failure
Absolute	1	1	..	..	..	..	..	..	1
Acute inflammatory	7	..	..	1	6	..	5	6	1
Simple	61	8	8	6	39	26	4	51	5
Secondary	5	4	..	..	1	1	4	4	1
Hemorrhagic	2	..	1	..	1	1	1	1	..
	76	13	9	7	47	..	..	..	..

GOOD RESULTS IN DIFFERENT TYPES OF GLAUCOMA

	No. of Cases	Per Cent.
Simple glaucoma.....	61.....	83.6
Acute inflammatory.....	7.....	85.7
Secondary	5.....	80
Hemorrhagic	2.....	50
All cases except simple..	15.....	73.3

TABLE 4.—RESULTS OF TREPHINING

	No.	Per Cent.			
Operations	76	.....		
Good results.....	62	81.58			
	No.	Good	Poor	Failure	Not Stated
Eyes having had previous iridectomy.....	13	11	1	1	0
Eyes having complete iridectomy at time of trephining	7	7	0	0	0
Total	20	18	1	1	0
Good results in 90 per cent.					
Eyes having partial iridectomy at time of trephining	47	37	5	5	0
Eyes in which no iridectomy was done.....	9	7	0	2	0
Total	56	44	5	7	0
Good results in 78.4 per cent.					

TABLE 5.—CLASSIFICATION WITH REFERENCE TO THE PRESENCE OR ABSENCE OF IRITIS IN CASES IN WHICH A PREVIOUS IRIDECTOMY HAD BEEN PERFORMED OR A COMPLETE IRIDECTOMY WAS DONE AT THE TIME OF OPERATION

	TREPHININGS FOLLOWED BY IRITIS			
	No. Iritis	No Iritis	Not Stated	
Cases having complete iridectomy at time of trephining	7	1	5	1
Having had previous iridectomy.....	13	1	10	2
Total	20	2=10%	15=75%	3
Having no iridectomy.....	9	7	2	0
Having partial iridectomy.....	47	22	23	2
Total	56	29=51%	25=44.6%	2

Of the twenty cases in which an iridectomy had been made, either at time of operation or previously, 10 per cent. showed signs of iritis, whereas in the fifty-six cases in which the trephining had been performed without or with a partial iridectomy, iritis was present in 51.7 per cent.

I have to acknowledge my great indebtedness to Colonel Elliot for his kindness in allowing me to present the results of his splendid work before the members of this Section.

My thanks are due to my assistant, Dr. William L. Benedict, for valuable assistance in tabulating the statistics here presented.

II. REPORT OF AUTHOR'S CASES

In the twenty-seven cases here reported, operation was performed at the Ophthalmic Clinic of the Uni-

versity of Michigan, except two, which were done in private practice.

TABLE 6.—SUMMARY OF AUTHOR'S CASES

Males.....	13	Eyes operated on.....	17
Females.....	7	Eyes operated on.....	10
	<u>20</u>		<u>27</u>
Cases in which both eyes were trephined			5
Cases in which the same eye was trephined twice.....			2

TABLE 8.—NUMBER AND TYPES OF CASES, TOGETHER WITH THE RESULTS OBTAINED IN EACH TYPE OF GLAUCOMA

Classification	No. of Cases	Good		Poor	Fail-
		No.	%	Results	ure
Acute	1	..	..	..	1
Simple	14	11	=78.5	2	1
Chronic inflammatory.....	6	4	=66.6	2	..
Secondary to cataract extract....	2	..	..	1	1
Secondary to luxated lens.....	1	..	..	..	1
Secondary to traumatism.....	1	1	..	..	..
Buphthalmos	2	..	..	..	2
	<u>27</u>	<u>16</u>		<u>5</u>	<u>6</u>

TABLE 9.—RESULTS OBTAINED IN CASES OF SIMPLE GLAUCOMA, COMPARED WITH THOSE IN ALL OTHER TYPES OF THE DISEASE AS CLASSIFIED

Type	No.	Results		
		Good	Poor	Failure
Simple	14	11=78.5	2=14.2	1=7.1
Other types.....	13	5=38.4	3=23.0	5=38.4
	<u>27</u>	<u>16</u>	<u>5</u>	<u>6</u>

Good results from simple cases.....78.5 per cent.
 Good results from all other cases.....38.5 per cent.

I shall not discuss the technic of the sclerocorneal trephining operation, but rather confine my report to the clinical facts as presented by the case histories, and base my conclusions on these findings alone.

TABLE 10.—CLASSIFICATION WITH REFERENCE TO THE PRESENCE OR ABSENCE OF IRITIS IN CASES IN WHICH A PREVIOUS IRIDECTOMY HAD BEEN PERFORMED OR A COMPLETE IRIDECTOMY WAS DONE AT THE TIME OF OPERATION

Character of Iridectomy	No.	Iritis		No Iritis	
		No.	Per Ct.	No.	Per Ct.
Complete iridectomy at time of trephine operation	8	1	= 12.5	7	= 87.5
Previous iridectomy	7	2	= 28.5	5	= 71.4
Partial iridectomy	8	6	= 75.0	2	= 25
Without iridectomy	4	4	= 100		
	<u>27</u>	<u>13</u>		<u>14</u>	

TABLE 11.—FREQUENCY OF OCCURRENCE OF IRITIS IN THE DIFFERENT FORMS OF IRIDECTOMY

	No.	Iritis		No Iritis	
		No.	Per Ct.	No.	Per Ct.
Total number of cases of complete and previous iridectomy	15	3 =	20	12 =	80
Total number of cases of partial or without iridectomy	12	10 =	83	2 =	16.6
	<u>27</u>	<u>13</u>		<u>14</u>	

Of the fifteen cases in which the iridectomy was complete, three showed signs of iritis and twelve showed no signs of inflammation of the iris. On the other hand, of the twelve cases in which a partial or no iridectomy was performed, ten had iritis, while but two escaped. These results favor a complete iridectomy in the proportion of 20 to 83.3.

The results obtained by Colonel Elliot as tabulated in Table 5 justify the same conclusion.

Of the twenty cases in which an iridectomy had been made, either at the time of operation or previously, 10 per cent. showed signs of iritis; whereas in the fifty-six cases in which the trephining had been performed without or with partial iridectomy, iritis was present in 51.7 per cent. These results favor a complete iridectomy in the proportion of 10 to 51.7.

Of the six failures two (Cases 3 and 4) were cases of buphthalmos in the same patient. In each eye there was loss of vitreous at the time of operation, and it is possible that the opening was made too far back. Photophobia and keratitis, which were present at the time of operation, were very much improved, but ten weeks later there was in each eye a small white spot at the site of the trephine opening, and the tension had increased from 48 to 70 mm. in the right eye, and from 48 to 68 mm. in the left eye. The tension both before and after operation was taken under ether anesthesia. One case of glaucoma, secondary to cataract operation followed by uveitis (Case 14), was a very unfavorable case for any operative procedure. The tension at the time of the operation was 36 mm. Twelve days after operation it was 14 mm., but soon increased, until in two months' time it had reached 100 mm. At this time the eye was enucleated for relief of pain, the patient refusing to submit to any other operative procedure. The fourth case (Case 15) was probably one of hemorrhagic

TABLE 7.—VISION AND TENSION BEFORE AND AFTER OPERATION, AND RESULT AS DETERMINED BY TENSION AT TIME OF LAST OBSERVATION

Case No.	Date	Type	Vision Before—After Operation *	Before mm.	Tension Date	After mm.	Result	Remarks
1	12/ 9/12	Traumatic secondary.	Nil	95	4/ 9/13	21	Good	
2	12/16/12	Simple	6/15	44	2/ 2/13	21	Good	
3	5/ 3/13	Buphthalmos	?	48	7/14/13	70	Failure	
4	5/ 3/13	Buphthalmos	?	48	7/14/13	60	Failure	
5	5/26/13	Simple	Nil	70	6/ 4/13	16	Good	
6	5/26/13	Secondary cataract...	5/30	83	7/12/13	47	Poor	Immediate result good 17 days after operation. Tension 16 mm. Discharged cured. One month later, tension 47.
7	7/ 7/13	Simple	1/60	47	7/ 8/13	20	Good	
8	10/31/12	Chronic inflammation.	Nil	60	3/13/13	13	Good	
9	10/3 /12	Chronic inflammation.	Nil	71	3/13/13	18	Good	
10	10/10/12	Simple	1. p.	39	1/27/14	16	Good	
11	10/17/12	Simple	1. p.	105	3/24/14	10	Good	
12	4/24/13	Simple	5/60	45	3/24/14	27	Good	
13	10/17/12	Simple	Obj.	60	10/ 3/12	12	Good	
14	10/31/12	Secondary	1. p.	36	2/ 7/13	100	Failure	Immediate results good. Tension at end of two weeks 14 mm. Hemorrhagic, Glau. O. S.
15	11/21/12	Chronic inflammation.	Nil	83	12/22/12	82	Failure	
16	2/24/13	Chronic inflammation.	Nil	60	5/ 5/13	60	Failure	
17	6/30/13	Chronic inflammation.	Nil	60	3/ 5/14	20	Good	
18	4/24/13	Sec. luxated lens....	Nil	91	1/ 7/14	55	Failure	
19	7/ 7/13	Simple	5/60	51	11/ 6/13	15	Good	
20	7/21/13	Simple	5/60	51	11/ 6/13	7	Good	
21	11/20/13	Chronic inflammation.	Fingers	50	1/19/14	18	Good	
22	10/20/13	Simple	Nil	60	10/31/13	70	Poor	
23	10/10/13	Simple	Nil	44	10/31/13	60	Poor	
24	1/ 8/14	Acute inflammation..	1. p.	62	2/ 2/14	50	Poor	Immediate results good. Tension 24, ten days after operation. Subsequent to last tension record eye soft, but tonometer record not recorded.
25	1/12/14	Simple	Nil	73	3/19/14	36	Good	
26	1/14/14	Simple	6/20	36	2/ 4/14	26	Good	
27	11/20/13	Simple	6/9	43	4/ 6/14	15	Poor	Immediate result perfect, chamber closed on 19th day. Quiet iritis, with exudate in pupillary space.

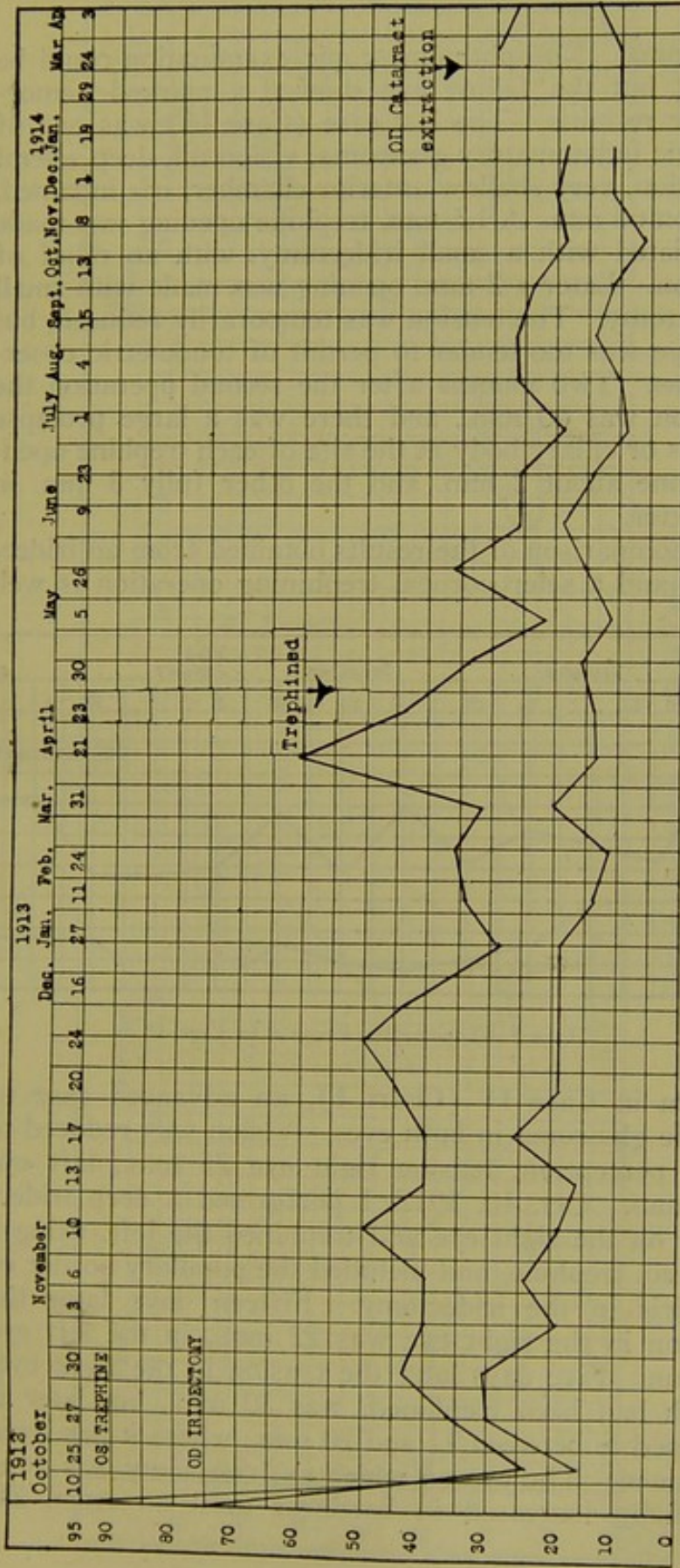


Chart 1.—Tonometric Records in Case 11.

glaucoma. No ophthalmoscopic examination could be made, but the fellow eye showed a marked hemorrhagic retinitis. The last case (Case 16) was one of chronic inflammatory glaucoma, vision nil, deep scleral injection, very shallow anterior chamber, iris inflamed, tension 60 mm. A 1.5-mm. trephine opening was made associated with a small iridectomy, with no relief of tension. Later a 2-mm. opening was made with small iridectomy. The tension was temporarily reduced, but the eye was too tender to permit of tonometric observations. Two months after the second operation the tension was 60 mm., and there was a large prolapse of iris or ciliary body at the site of each trephine opening, one about 2 mm. and the other fully 3 mm. in diameter.

A comparison of the results obtained from an iridectomy and a sclerocorneal trephining operation is well

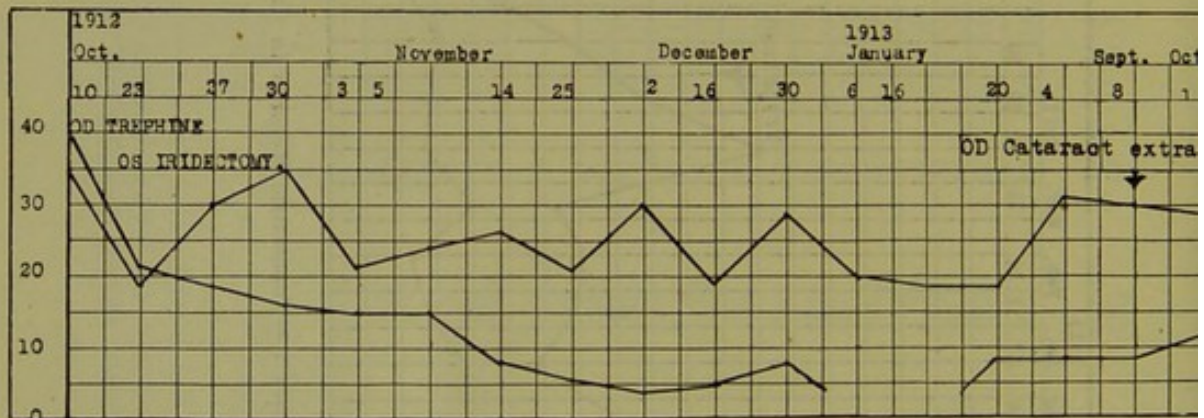


Chart 2.—Tonometric Records in Case 10.

shown in Case 11 (Chart 1), an advanced case of simple glaucoma in both eyes. Vision was reduced to light perception, tension right eye 75 mm., left eye 105 mm. Oct. 10, 1912, I performed a deep iridectomy on the right eye and trephined the left, using a 1.5-mm. trephine, and included the pupillary border of the iris in the iridectomy. Fifteen days later the tension in the right eye was 22 mm., in the left eye 18 mm. Five days later the tension in the right eye, which had been trephined, was 30 mm., but later it dropped to between 11 and 20 mm., where it has since remained. The eye on which an iridectomy was done gradually increased in hardness until on April 21,

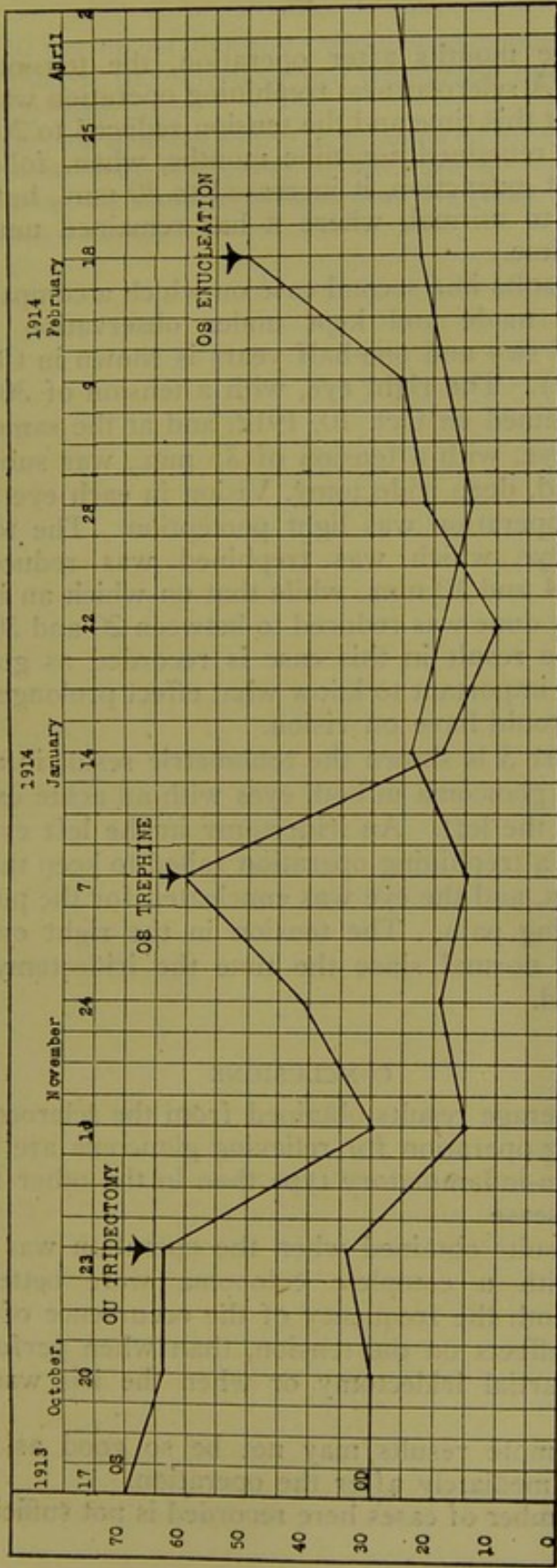


Chart 3.—Tonometric Records in Case 24.

1913, five months after operation, the tension was 60 mm. A sclerocorneal trephining operation was performed at this time and the tension reduced to 20 mm., where it remained for nine months, when, following a cataract extraction, it increased to 30 mm., but soon dropped to normal, where it has remained until the present time.

The results in a second case on which a comparative test was made and kept under observation for a period of two and one-half years is shown in Chart 2 (Case 10). The right eye, with a tension of 30 mm., was trephined on Oct. 10, 1912, and at the same time the left eye, with a tension of 35 mm., was subjected to a broad, deep iridectomy. Vision in each eye at the time of operation was light perception. The tension of the eye which was trephined was reduced to between 4 and 10 mm., while that on which an iridectomy was done was reduced to between 20 and 30 mm. While the result in this case is recorded as good, it would be important to know what effect prolonged low tension would have on vision.

In Chart 3 is shown the tonometric result in a case of simple glaucoma in both eyes with an acute exacerbation in the left. An iridectomy in the left eye followed by a trephining operation failed to keep the tension down, and the eye was enucleated for the purpose of relieving pain. The tension in the right eye has remained normal since the time the iridectomy was performed.

CONCLUSIONS

The average results obtained from the sclerocorneal trephining operation for relieving glaucoma are better in the non-inflammatory type than in the other forms of the disease.

The results obtained when the operation was associated with a complete coloboma were better, as regards both the frequency of the occurrence of iritis and the effects on the tension, than when performed with a partial iridectomy or when the iris was left intact.

The remote results may not be so good as those shown immediately after the operation.

The number of cases here recorded is not sufficiently

large to permit of definite conclusions concerning the real value of the sclerocorneal trephining operation in relieving glaucoma.

I am greatly indebted to Dr. D. V. Smith of the Ophthalmic Department of the University of Michigan for valuable aid in preparing the statistics presented in this paper.

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large to permit of definite conclusions regarding the
 fact that in the above-mentioned technical operations in
 technical operations
 - I am sorry to hear that Dr. L. V. Smith is no longer
 Director of the Institute of Technology, the records of
 his work are being preserved in this paper
 Dr. L. V. Smith