

Effect of Hypnosis on Intraocular Pressure in Normal and Glaucomatous Subjects

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THE RATIONALE of making an investigation of the effect of hypnosis on intraocular pressure rests firstly on a recognition that hypnosis is capable of exerting a profound influence on various somatic fields of function. The ability to produce alterations of motor function such as paralysis and catalepsy, and alterations of sensory functions such as anesthetics, hysterical blindness, and deafness, has been recognized since the earliest days of hypnosis. Of more recent vintage have been the studies of the effect of hypnosis on the gastrointestinal system, and the cardiovascular and renal systems. Most provocative recent work has demonstrated EEG alterations and even abnormal Babinski response produced during hypnotic age regression. The bulk of the work on the effects on physiological functioning possible with hypnosis has been done in Europe, but most of the significant contributions in this field have been excellently summarized by Gorton and Reiter. Reiter comments by way of summary:

It is a generally recognized fact in principle that, by means of hypnosis, it is practicable, in individual varying measure, to influence both

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mentally and physically the functioning of any reactive system within the organism. Insofar as the physical phase is concerned, it is of course, a question of an emotional or sensory influence that partly may affect directly through the vegetative nervous system the individual organs or vegetatively innervated system of organs. Although it is still limited, the sphere of operations which can thus be affected by hypnosis is very great.

Secondly, the rationale for the proposed investigation rests on the generally accepted belief that the emotions may play an important role in the regulation of intraocular pressure, and particularly in pathological states characterized by an elevation in such pressure, namely glaucoma. This becomes relevant to the proposed study when hypnosis is regarded as a dynamic and highly emotionally invested interpersonal relationship. The ophthalmological literature contains abundant clinical testimony to the importance of emotions in ocular hypertension.^{1, 7, 8} Duke Elder⁷ has noted that the excitable temperament of glaucomatous subjects has been commented upon as early as 1818 by Demours and later by V. Graefe in 1853-1855, Donders in 1862, and de Wecker in 1863. Harrington has recently stated:

In the light of present knowledge of the anatomic and physiologic connections of the autonomic nervous system with the higher cerebral centers through the hypothalamus, it is entirely logical to assume that this governing mechanism in the maintenance of a constant

level of intra-ocular pressure, vulnerable as it is to psychic disturbance, may thus directly affect the delicate balance of the intra-ocular pressure.

The work of H. S. Ripley⁷ is significant in that it provides considerable experimental validation of the important and perhaps in some cases paramount association between states of emotional upheaval and glaucoma. Ripley concludes:

It was repeatedly found that increased severity of eye symptoms and elevation of intra-ocular pressure coincided with accentuation of previously existing frustrations or the development of new threats to the patient's security. During interviews it was possible to demonstrate definite changes in intra-ocular pressure associated with changes in emotional reaction or preoccupation with frustrating personal problems. At times when the patient was relatively happy and well relaxed, pressure was lower. In association with emotional responses there is, in some individuals, participation of the eye in the upheaval, and increase in intra-ocular pressure which may represent an inappropriate biological reaction pattern of mobilization.

In the light of the above discussion, the investigation herein described was designed to help answer three questions:

1. Using an induction technique characterized by an emotional atmosphere of security and relative freedom from anxiety, does the hypnotic state per se affect the intra-ocular pressure?
2. Is it possible by direct suggestion of symptom relief in the hypnotic or the waking state to affect those somatic regulatory mechanisms concerned with the maintenance and control of intra-ocular pressure and thereby effect an alteration in the intra-ocular tension?
3. Is it possible to affect the intra-ocular pressure by hypnotically induced strong emotion?

Method

Eleven glaucomatous patients attending the Eye Clinic of the Grace-New Haven Community Hospital were selected for the project (Table 1). The patients ranged in

age from 52 to 67 years, and all were afflicted with chronic primary glaucoma and had been followed in the clinic for periods ranging from 3 months to 7 years. In each instance detailed records were available as to the subjective complaints, along with the results of regular periodic evaluation by the ophthalmologist. Patients chosen for the study filled these criteria and, in addition, were picked on the basis of appearing to be reasonably intelligent, willing to participate in the study, and having schedules which permitted the requisite time commitments.

Each patient was oriented individually in the eye clinic by the ophthalmologist (P. J. S.) All were told that it was believed that emotions played some role in glaucoma. They were then invited to participate in a series of hypnotic sessions designed in an attempt to learn more about the relationship between their "feelings" and their eye disease. Although the words "research" or "experiment" were not used, the patients were clearly given to understand that the sessions were designed to help us learn more about their ailment, rather than to render specific treatment or benefit.

Also chosen for the experiment were four subjects with normal intra-ocular pressure and in good general health. All of these volunteers had previous experience as hypnotic subjects. They were told in broad terms of the procedures that they would be subjected to, but were not otherwise informed of the nature or purpose of the experiment.

At the appointed time the psychiatrist (A. S. B.) met with the whole group, consisting of 11 patients and 4 normals. A brief explanation of the nature of hypnosis was then given, describing it essentially as a relaxation technique accompanied by increased suggestibility. A short question-and-answer type of discussion period followed in which an attempt was made to learn of any previous knowledge or experience with hypnosis that the members of the group had, and to dispel any existing fears and misconceptions about hypnosis. Group

TABLE I. CHARACTERISTICS OF GLAUCOMATOUS GROUP

Name	Sex/age/race	Anatomy	Known duration of disease	Type of treatment	Highest Lowest tension during past year (mm. Hg)	Average tension during past yr.	Other diseases and misc.	Hypnotizability
B.R.	F/52/W	Narrow angle, many synechiae	4 yr.	Medical	45.0 24.0	28 0	Peptic ulcer	Good
M.G.	F/66/W	Closed angle, acute attacks, distorted architecture	7 yr.	1950: iridectomy O.S. Trephine O.D. Cyclodialysis O.D.	33 0 18 0	22 0	Acute attack with emotion	Good
L.E.	M/58/C	Closed angle, many synechiae	3 mo.	Medical	48 0 20 0	Good control during past mo— 22	No acute attacks but increased symptoms when emotionally upset	Good
C.O.	F/54/W	Narrow angle, few synechiae	6 yr.	Medical	27 0 20 0	23 0	Hypertension	Good
D.A.	M/67/W	Narrow angle, few synechiae	7 yr.	1951: iridectomy O.S. Medical O.D.	27 0 16 0	20 0	Excitable, former stage hypnotist	Poor
W.H.	F/64/W	Open angle, rubeosis	2 yr.	Medical	46 0 20 0	29 0	Diabetes of moderate severity	Poor
O.M.	F/67/W	Narrow angle, few synechiae	3 yr.	1954: iridectomy O.S. Medical O.D.	32 3 18 0	25 0	Very quiet and withdrawn	Poor

hypnosis was then carried out, using a levitation technique. No suggestions relating to the eye were made. The subjects were told that they would awaken on signal, that they would feel refreshed, and that they would become hypnotized more rapidly and more deeply the next time.

In accordance with our customary technique, hypnosis was carried out with the eyes closed. The subjects were told in each instance that the ophthalmologist, whom they all knew well, would come over to them, open the eye, and perform the tonometry. The glaucomatous subjects had all experienced this procedure innumerable times. It was suggested that the tonometry would not disturb the hypnotic trance and that, indeed, they would scarcely take no-

tice of it. Tonometric readings were obtained, initially, during the hypnotic trance, and again posthypnotically.

Following the initial session, the group was divided into three subgroups, as follows:

1. Four normal, hypnotizable subjects.
2. Four glaucomatous subjects who were hypnotizable to the point of amnesia within the initial session.
3. Three glaucomatous subjects who could not be hypnotized during the initial session.

The remaining 4 glaucomatous subjects who took part in the initial session were not employed for the remainder of the sessions, 3 having been eliminated because their schedules would not permit further

participation, and 1 because she was of apparently borderline intelligence and unable to understand the directions adequately.

At the second session, the subjects were asked to describe their eye complaints in their own words. While fully awake, they were then given forceful suggestions of symptom relief, the physician employing in his suggestions the very words that the patients had used in describing their complaints. Suggestions were made to the effect that the eye would feel relaxed and comfortable with clear vision, and that each subject would note the marked diminution or disappearance of pain, heaviness, headaches, tearing, haloes, and clouded vision. The group was then hypnotized and the same suggestions repeated during the hypnotic trance. The subjects were then given suggestions as to continued posthypnotic symptom relief, and were awakened on signal. Tonometric readings were obtained before and after waking suggestion of symptom relief, after hypnotic suggestion of symptom relief, and again posthypnotically.

In the third and final session, the subjects were hypnotized and each was asked to picture himself as a participant in a specific dilemma which was elaborately and vividly described. The dilemma was such as to cause the subject to experience strong anxiety and guilt feelings. In addition, direct suggestions were made as to the subjects' experiencing these emotions strongly. A satisfactory and pleasant outcome was then described, suggestions of immediate and posthypnotic symptom relief were made, and the subjects awakened. Tonometric readings were taken initially, during the trance after the suggested anxiety situation, and again posthypnotically.

Results

Initial Pressure

At the first session, on the initial reading all glaucomatous subjects had low pressures. In 3 instances, the pressures were lower in one or both eyes than had been

recorded during the entire previous year. In 3 instances the pressure was in the lower range of the patients' usual pressures. In 1 instance the pressure was greater than the patient's average pressure had been by 1.2 mm.

One may speculate as to the reasons for these low initial readings. The meetings were held in the evening and it is well known that intraocular pressure tends to be lower in the evening than during the day. Previous clinic readings had been taken either during the morning or early afternoons. An additional factor of possible significance is that during the hypnotic sessions the patients did not have to wait as they usually did during clinic days, and the atmosphere was quiet and relaxed with a great deal of individual attention shown to each patient.

Pressure During Trance

In glaucomatous subjects, hypnosis per se caused no significant alterations in intraocular pressure, with a single exception. L. E., the patient with the highest initial reading in the group, showed a marked drop of 23.5 mm. in the right eye, but only an insignificant drop of 5.3 mm. in the left eye. Posthypnotically, his pressure rose to a level slightly below the initial prehypnotic pressure in the right eye, and was virtually unchanged in the left eye. One other subject showed a rise of 13.3 mm. in the right eye posthypnotically. This was an isolated and atypical finding.

In the normal subjects, 3 showed a slight rise during hypnosis per se, the average rise being 5.5 mm., and the greatest rise being 8.5 mm. One subject showed a slight drop. The number of normal subjects is probably too small to warrant any conclusions as to whether or not these slight alterations in intraocular pressure as a result of hypnosis per se are significant. Recent research in other somatic fields of function has supported the generally accepted finding that there is no single physiological variable that has been shown to alter reliably with the induction of hypnosis.

TABLE 2. TONOMETRIC READINGS

Name	1st session			2nd session			3rd session			
	Pressure ^a before first session	During trance	Post- hypnosis	Before waking sugges- tion of symptom relief	After waking suggestion	During hypnosis with sug- gested symptom relief	Post- hypnosis with sug- gested symptom relief	Initial pressure during trance	During trance after sug- gested anxiety	Post- hypnosis after suggested symptom relief
B.R.	32.0 20.6	26.4 20.0	24.2 21.6	26.2 24.2	20.0 13.1	30.3 21.9	31.2 20.2	29.3 21.0	25.8 25.8	16.4 16.4
M.C.	20.0 18.6	19.0 19.0	19.8 20.6	21.0 21.0	14.8 13.1	18.0 21.8	21.0 20.6	21.0 22.4	23.2 21.9	22.3 22.3
L.E.	34.0 28.4	10.5 23.1	28.4 23.0	21.0 19.4	10.0 13.9	19.4 22.2	15.0 15.0	26.2 25.0	26.2 18.5	22.3 18.5
C.O.	24.2 24.2	18.5 18.5	21.0 21.0	22.6 19.0	12.0 12.0	15.6 18.5	18.0 18.0	26.2 26.2	25.0 25.0	22.3 21.4
D.A.	15.1 15.1	13.2 17.0	20.4 16.5	15.6 11.2	9.8 9.9	18.5 15.2	18.0 13.6	15.6 14.7	18.0 18.0	15.6 12.8
W.H.	15.1 15.1	18.2 20.2	28.4 22.4	25.0 21.8	16.1 15.0	25.8 20.2	25.8 20.2	20.2 26.1	29.6 30.4	23.4 23.4
O.M.	25.0 22.4	18.5 24.2	28.2 24.2	21.8 20.1	13.1 18.0	25.8 24.0	21.8 15.6	26.1 25.3	22.4 23.4	23.4 23.4
(Normals)										
I.S.	11.5 11.5	16.0 18.0	16.0 16.0	19.1 18.1	20.7 19.9	25.0 25.8	21.0 21.0	25.1 25.1	19.2 29.4	19.0 22.3
B.E.	11.5 11.5	14.4 14.4	10.5 10.5	14.0 14.0	11.1 15.2	18.0 17.1	15.6 15.6	20.2 21.2	15.0 15.0	12.8 13.8
M.O.	11.5 10.5	19.0 19.0	16.5 16.5	13.9 12.0	13.9 13.6	21.9 25.8	20.4 20.4	13.9 13.9	19.0 18.0	18.0 15.0
F.O.	15.1 15.1	11.2 11.2	13.2 13.2	16.2 15.0	16.7 14.9	21.4 17.0	16.2 16.0	19.0 19.0	19.0 19.0	15.6 18.0

^aAll pressures given in mm. Hg, right eye above line, left eye below.

Pressure After Suggestion of Relief

After waking suggestion of symptom relief, all glaucomatous subjects showed drops in pressure ranging from 2.1 to 11.1 mm. After waking suggestion of symptom relief, all patients had the lowest pressures recorded for them during the past year. (One subject had been followed for only 3 months.) This finding was observed in every case in this series. During hypnotic suggestion of symptom relief, all pressures rose to approximately the level present before the waking suggestions had been made, and remained at approximately the same level posthypnotically.

During hypnosis with suggested symptom

relief, normal subjects tended to show an increase in pressure, averaging about 6.5 mm. Posthypnotically the pressures tended to drop to prehypnotic levels.

Pressure During Suggestion of Anxiety

Hypnotic suggestion of strong emotion (anxiety) produced no consistent significant alterations in pressure in either glaucomatous or normal subjects. Posthypnotic suggestion of symptom relief again produced no significant or consistent alteration in pressure.

Patients' Feelings at End of Investigation

At the conclusion of the last hypnotic session, several glaucomatous patients ex-

pressed their appreciation for having been permitted to participate in this investigation. They also indicated that they had derived various benefits as a result of coming. One patient, for example, said that she had been able to sleep better during the last few weeks than she had in many years. Another claimed that his eyes were tearing less. Another indicated that his eyes felt about the same but that he was less concerned or worried about them than formerly.

Conclusions

1. Low intraocular tensions were consistently obtained at the first session prior to hypnosis. This may have been due to the psychological situation which made for relaxation and decreased muscular tension and/or to the evening hour at which the meeting was held (diurnal curve of intraocular pressure).

2. In general, hypnosis per se caused no significant alteration in the intraocular tension of glaucomatous subjects. Normal subjects tended to show a small rise in pressure.

3. On direct waking suggestion of symptom relief, all glaucomatous patients had an appreciable drop in the pressure of one or both eyes. Similar suggestions made during hypnosis produced no such drop.

4. Posthypnotic suggestion of symptom relief produced no significant drop in pressure, although several patients volunteered that they had experienced marked subjective symptomatic improvement.

5. Hypnotizability did not appear to be a significant variable with respect to the lability of intraocular tension as herein studied.

6. Some glaucomatous patients had marked lowering of tension in one eye as compared with the other during various parts of the procedure. This suggests greater lability or capacity for change in one eye, or less inroads on the anatomy of the angle in one eye. Still another possible explanation of this observation is that it represents an expression of marked ambival-

ence, a phenomenon commonly noted in hypnotic subjects.

7. A hypnotically suggested anxiety situation produced no significant effect on the intraocular tension in normal or glaucomatous subjects. This observation is not in accord with our clinical impression that anxiety, be it naturally occurring or experimentally induced, is capable of causing significant elevations in pressure. We are inclined to believe that our equivocal data in this instance is probably attributable to a deficit in our technical skill. The anxiety-producing stimulus story may have failed to arouse true anxiety, perhaps because a loved one rather than the subject himself was depicted in a situation of great jeopardy. In addition, the group situation does not lend itself to the production of anxiety.

8. The actual mechanism or mechanisms accounting for the effects of suggestion on intraocular tension is unknown.

Summary

An attempt was made to study the effect of hypnosis on intraocular tension in normal and glaucomatous subjects. Measurements were made with a recently standardized electronic tonometer (Mueller). Seven patients with chronic primary glaucoma, ranging in age from 52 to 67, and 4 young, healthy, normal subjects were studied. Four of the glaucomatous patients were hypnotizable to the point of amnesia in one session, while 3 were not hypnotizable under these conditions. All the normal subjects were highly hypnotizable. The study provided data on the effect on intraocular tension of: (1) hypnosis per se; (2) waking and hypnotic suggestion of symptom relief; (3) posthypnotic suggestion of symptom relief; (4) a hypnotically suggested anxiety situation.

The single, most impressive finding was that on direct waking suggestion of symptom relief, all glaucomatous patients showed a drop in the pressure of one or both eyes to a level as low as (1 case) or lower than (6 cases) the lowest recorded

tension during the previous 12 months that they had been followed in the eye clinic. (One subject had been followed for only 3 months.) Posthypnotic suggestion of symptom relief resulted in subjective improvement only in several of the patients. These patients volunteered such improvement as having fewer headaches, less tearing, feeling generally more relaxed, and sleeping better.

These findings serve to emphasize the significant role of the emotions in glaucoma, although the mechanisms involved remain obscure.

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